

AERONAUTICAL ELECTRONIC AND ELECTRICAL LABORATORY  
**U.S. NAVAL AIR DEVELOPMENT CENTER**  
JOHNSVILLE, PENNSYLVANIA

Reported by: *Samuel Wolin*  
S. Wolin  
Control and Guidance Division

Approved: *M. J. Madigan*  
M. J. Madigan, Superintendent  
Control and Guidance Division

*J. H. Russell*  
J. H. Russell  
Deputy Director

REPORT NO. NADC-EL-52195

11 FEB 1954

PHASE REPORT  
TABLES OF TRANSMISSION AND  
REFLECTION COEFFICIENTS OF  
LOSSY, HOMOGENEOUS DIELECTRIC SHEETS  
VOLUME I

64129  
BUREAU OF AERONAUTICS  
TED Project No. ADC EL-800 (Revised)

# **Aeronautical Electronic and Electrical Laboratory**

**REPORT NO. NADC-EL-52195**

## **ABSTRACT**

This report contains a set of tables of transmission and reflection coefficients as well as phase shift data for lossy, homogeneous dielectric sheets. The report supplements Report No. ADC EL-123-50, "The Electrical Design of Lossy High-Incidence Radomes," of 11 July 1950. It has been prepared for the benefit of designers who may be required to make a theoretical study of the electrical performance of a proposed radome design.

These tables were computed by the International Business Machines Corporation, 500 Madison Avenue, New York 22, New York under Navy Contract No. N393s-72065.

REPORT NO. NADC-EL-52195

TABLE OF CONTENTS

	Page
ABSTRACT . . . . .	ii
LIST OF SYMBOLS . . . . .	1
INTRODUCTION . . . . .	1
RANGE OF VARIABLES . . . . .	2
EQUATIONS FOR REFLECTION AND TRANSMISSION COEFFICIENTS OF LOSSY, HOMOGENEOUS DIELECTRIC SHEETS . . . . .	2
USE OF TABLES . . . . .	4
SPECIAL NOTE IN USING TABLES . . . . .	5
ILLUSTRATION OF USE OF TABLES . . . . .	5
APPLICATION OF TABLES TO COMPUTE THE RELATIVE PHASE SHIFT . . . . .	7
APPLICATION OF TABLES TO COMPUTE THE PHASE DE- LAY (OR INSERTION PHASE SHIFT) CREATED BY A HOMOGENEOUS LOSSY DIELECTRIC SHEET . . . . .	7
APPLICATION OF TABLES TO COMPUTE THE TRANS- MISSION AND REFLECTION COEFFICIENTS OF ANY MULTILAYER DIELECTRIC SANDWICH AT ARBITRARY INCIDENCE . . . . .	8
REFERENCES . . . . .	9
TABLES OF TRANSMISSION AND REFLECTION COEFFI- CIENTS OF LOSSY, HOMOGENEOUS DIELECTRIC SHEETS . .	10
FIGURE	
I Lossy Homogeneous Dielectric Plane Sheet . . . . .	3

REPORT NO. WADC-EL-52195

LIST OF SYMEOLS (Figure 1)

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$L = \frac{\epsilon \tan \delta}{2(\epsilon - \sin^2 \theta)}$$

$$P = 2L = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$r$  = Reflection coefficient at interface of a homogeneous dielectric sheet and air for an incident plane wave traveling from the dielectric sheet to air

$$r_{||} = \frac{\epsilon \cos \theta - \sqrt{\epsilon - \sin^2 \theta}}{\epsilon \cos \theta + \sqrt{\epsilon - \sin^2 \theta}}$$

= Reflection coefficient at interface of a homogeneous dielectric sheet and air for an incident plane wave traveling from the dielectric sheet to air for parallel polarization

$$r_{\perp} = \frac{\sqrt{\epsilon - \sin^2 \theta} - \cos \theta}{\sqrt{\epsilon - \sin^2 \theta} + \cos \theta}$$

= Reflection coefficient at interface of a homogeneous dielectric sheet and air for an incident plane wave traveling from the dielectric sheet to air for perpendicular polarization

$\bar{R}$  = Reflection coefficient of a lossy, homogeneous dielectric plane sheet for an arbitrary thickness ( $x$ ) and angle of incidence,  $\theta$

$R$  =  $|\bar{R}|$  = The magnitude of the reflection coefficient  $\bar{R}$

$R'$  = The phase associated with the reflection coefficient  $\bar{R}$

$\bar{R}_{||}$  = Reflection coefficient of a lossy, homogeneous dielectric plane sheet for parallel polarization

## REPORT NO. NADC-EL-52195

## LIST OF SYMBOLS (continued)

- $R_{\parallel}$  =  $|\bar{R}_{\parallel}|$  = The magnitude of the reflection coefficient  $\bar{R}_{\parallel}$   
 $R'_{\parallel}$  = The phase associated with the reflection coefficient  $\bar{R}_{\parallel}$   
 $\bar{R}_{\perp}$  = Reflection coefficient of a lossy, homogeneous dielectric plane sheet for perpendicular polarization  
 $R_{\perp}$  =  $|\bar{R}_{\perp}|$  = The magnitude of the reflection coefficient  $\bar{R}_{\perp}$   
 $R'_{\perp}$  = The phase associated with the reflection coefficient  $\bar{R}_{\perp}$   
 $\bar{T}_n$  = Transmission coefficient of a lossy, homogeneous dielectric plane sheet for an arbitrary thickness ( $x$ ) and angle of incidence,  $\theta$   
 $T_n$  =  $|\bar{T}_n|$  = The magnitude of the transmission coefficient  $\bar{T}_n$   
 $T'_n$  = The phase associated with the transmission coefficient  $\bar{T}_n$   
 $\bar{T}_{n\parallel}$  = Transmission coefficient of a lossy, homogeneous dielectric plane sheet for parallel polarization  
 $T_{n\parallel}$  =  $|\bar{T}_{n\parallel}|$  = The magnitude of the transmission coefficient  $\bar{T}_{n\parallel}$   
 $T'_{n\parallel}$  = The phase associated with the transmission coefficient  $\bar{T}_{n\parallel}$   
 $\bar{T}_{n\perp}$  = Transmission coefficient of a lossy, homogeneous dielectric plane sheet for perpendicular polarization  
 $T_{n\perp}$  =  $|\bar{T}_{n\perp}|$  = The magnitude of the transmission coefficient  $\bar{T}_{n\perp}$   
 $T'_{n\perp}$  = The phase associated with the transmission coefficient  $\bar{T}_{n\perp}$   
 $x$  = Thickness of dielectric plane sheet  
 $\tan \delta$  = Loss tangent of dielectric sheet

REPORT NO. NADC-EL-52195

LIST OF SYMBOLS (continued)

- $\Delta$  =  $T'_{n_{\perp}} - T'_{n_{\parallel}}$  = Relative phase shift between the perpendicular and parallel components of the transmitted wave
- $\Delta p_{\perp}$  = Phase delay (insertion phase shift, or insertion phase difference) created by a lossy, homogeneous dielectric plane sheet for perpendicular polarization
- $\Delta p_{\parallel}$  = Phase delay (insertion phase shift, or insertion phase difference) created by a lossy, homogeneous, dielectric plane sheet for parallel polarization
- $\epsilon$  = Dielectric constant of dielectric sheet
- $\theta$  = Angle of incidence or angle between the incident r. p. and the normal to the panel surface at the point of intersection
- $\lambda$  = Free space wavelength
- $\psi = \frac{2\pi x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$

NOTES:

- Any complex number or vector quantity

$$\bar{Z} = Z e^{jZ'} = Z / \underline{Z'} = Z \exp. (jZ'),$$

where

$Z = |\bar{Z}|$  = the magnitude of  $\bar{Z}$  and

$Z'$  = the phase angle of  $\bar{Z}$ .

This notation is used consistently throughout the report.

- The subscript  $\perp$  refers to perpendicular polarization, and the subscript  $\parallel$  refers to parallel polarization.

REPORT NO. NADC-EL-52195

INTRODUCTION

This report contains tables of transmission and reflection coefficients and phase shift data of lossy, homogeneous dielectric sheets. The tables are based on equations (1) to (4) inclusive, page 2. Derivations of these equations appear in reference (a).

This report supplements Report No. ADC EL-123-50, "Electrical Design of Lossy High-Incidence Radomes," reference (b). It has been prepared for the benefit of designers who may be required to determine the electrical performance of a proposed radome design. These tables should also be of value to engineers and physicists doing work on optical theory and design, electromagnetic theory, radar, radomes (plastic housings for infrared transmitting or receiving equipment), and propagation.

In these tables the quantities  $T_n$ ,  $T_n^2$ ,  $T'_n$ ,  $R$ ,  $R^2$ , and  $R'$  are computed as a function of  $d_s$ , with  $P$  and  $r$  as parameters. For definitions of these symbols see page iv.

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52125

## RANGE OF VARIABLES

The ranges of the variables are:

$d_s = 0.05, 0.15, 0.25, 0.35, 0.45, 0.50, 0.55, 0.65, 0.75, 0.85, 0.95,$   
 $1.00, 1.05, 1.15, 1.25, 1.35, 1.45, \text{ and } 1.50$  (19 values)

$r = 0$  to  $0.99$ , in steps of  $0.01$  (100 values)

and

$P = 0.0000, 0.0050, \text{ and } 0.0100$  (3 values)

## EQUATIONS FOR REFLECTION AND TRANSMISSION COEFFICIENTS OF LOSSY, HOMOGENEOUS DIELECTRIC SHEETS

The equations used for computing these tables are as follows:

$$\bar{R} = P/\bar{K}' = \frac{-r \left[ 1 - \exp.(-2\psi L + 2j\psi) \right]}{1 - r^2 \exp.(-2\psi L + 2j\psi)} \quad (1)$$

and

$$\bar{T}_n = T_n/\bar{T}_n' = \frac{(1 - r^2) \exp.(-\psi L + j\psi)}{1 - r^2 \exp.(-2\psi L + 2j\psi)} \quad (2)$$

where

$$\psi = \frac{2\pi x}{\lambda} \sqrt{\epsilon - \sin^2 \theta} \quad (3)$$

$$L = \frac{\epsilon \tan \delta}{2(\epsilon - \sin^2 \theta)} \quad (4)$$

REPORT NO. NADC-EL-52195

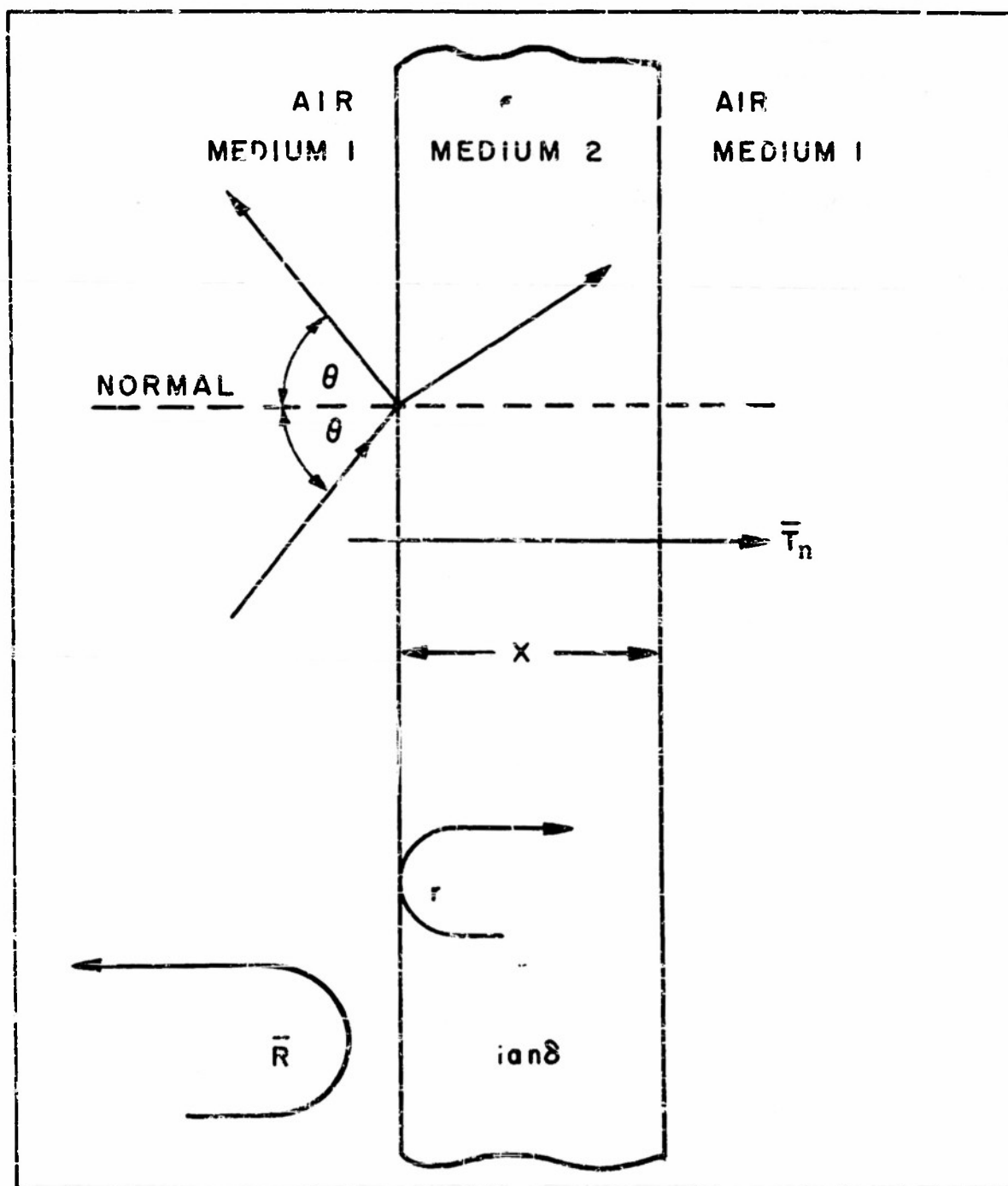


FIGURE 1 - Lossy Homogeneous Dielectric Plane Sheet

REPORT NO. NADC-EL-52195

USE OF TABLES

To use the tables in this report, the following information must be given:

$\epsilon$ ,  $\tan \delta$ ,  $\theta$ , and  $x/\lambda$

Step 1

Compute  $d_s$  and  $P$  by means of equations (5), (6), and (7).

$$d_s = \frac{x}{\lambda} M \quad (5)$$

and

$$P = \frac{\epsilon \tan \delta}{M^2}, \quad (6)$$

where

$$M = \sqrt{\epsilon - \sin^2 \theta}. \quad (7)$$

These computations may be facilitated by looking up the quantities  $M$  and  $\epsilon/M^2$  in reference (c) for the given values of  $\theta$  and  $\epsilon$ . Also look up  $r_{\perp}$  and  $r_{\parallel}$  in reference (c) for the given values of  $\theta$  and  $\epsilon$ .

Step 2

Locate in the tables of this report the correct values of  $T_n$ ,  $T_n^2$ ,  $T_n'$ ,  $R$ ,  $R^2$ , and  $R'$  for the given values of  $d_s$ ,  $P$ ,  $r_{\perp}$ , and  $r_{\parallel}$ . Select the nearest value of  $P$  and  $r$  in the tables and interpolate for  $d_s$ .

For perpendicular polarization let  $r = r_{\perp}$  and for parallel polarization let  $r = r_{\parallel}$ .

It is advisable that the data in these tables be plotted in the form of curves, similar to those of reference (b), for particular radome design problems.

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

## SPECIAL NOTE IN USING TABLES

These tables are correct for all values of  $r > 0$ . However, in cases where  $r_{||} < 0$ ,  $R^*$  should be adjusted to read

$$R_{||}' = R^* (\text{in tables}) + \pi.$$

## ILLUSTRATION OF USE OF TABLES

Given:

$$\epsilon = 1.2,$$

$$\tan \delta = 0.005,$$

$$\theta = 30^\circ.$$

and

$$x/\lambda = 0.4$$

To find:

$$T_n^2, T_n', R^2 \text{ and } R'$$

for both perpendicular and parallel polarizations.

Step 1.

$$\text{For } \epsilon = 1.2 \text{ and } \theta = 30^\circ,$$

$$M = \sqrt{\epsilon - \sin^2 \theta} = 0.97468$$

and

$$\epsilon/M^2 = 1.2632 \text{ from reference (c).}$$

From equation (5),

$$d_s = \frac{x M}{\lambda} = (0.4) (0.97468) = 0.390$$

## REPORT NO. NADC-EL-52195

From equation (6),

$$P = \frac{\epsilon \tan \delta}{M^2} = (1.2632)(0.005) = 0.00632$$

Also, for  $\epsilon = 1.2$  and  $\theta = 30^\circ$ ,

$$r_{\perp} = 0.0590 \text{ and } r_{\parallel} = 0.0321 \text{ from reference (c).}$$

## Step 2

For  $d_s = 0.390$ ,  $P = 0.005$ , and  $r_{\perp} = 0.06$ , the following is obtained from these tables:

For perpendicular polarization

$$T_{n_{\perp}}^2 = 0.99$$

$$T'_{n_{\perp}} = 2.45$$

$$R_{\perp}^2 = 0.006$$

$$R'_{\perp} = 4.01$$

For  $d_s = 0.390$ ,  $P = 0.005$ , and  $r_{\parallel} = 0.03$ , the following is obtained from these tables:

For parallel polarization

$$T_{n_{\parallel}}^2 = 0.99$$

$$T'_{n_{\parallel}} = 2.45$$

$$R_{\parallel}^2 = 0.002$$

$$R'_{\parallel} = 4.01$$

The error introduced by using  $P = 0.005$  instead of  $P = 0.00632$  is negligible.

REPORT NO. NADC-EL-52195

# APPLICATION OF TABLES TO COMPUTE THE RELATIVE PHASE SHIFT

The relative phase shift between the perpendicular and parallel components of the transmitted wave is given by the equation

$$\Delta = T'_{n_{\perp}} - T'_{n_{\parallel}} \quad (8)$$

The relative phase shift ( $\Delta$ ) is used in computing the effective power transmission coefficient of a differential area of a curved radome. A discussion of the use of the effective power transmission coefficient in radome design is given in references (a) and (b). For a definition of "effective power transmission coefficient" see page 135 of reference (b).

## APPLICATION OF TABLES TO COMPUTE THE PHASE DELAY (OR INSERTION PHASE SHIFT) CREATED BY A HOMOGENEOUS, LOSSY DIELECTRIC PLANE SHEET

A useful application of these tables is the calculation of the phase delay (insertion phase shift, or insertion phase difference) created by a homogeneous, lossy dielectric plane sheet, including the effects of multiple reflections in the sheet. Phase retardation data is important in determining the pattern distortion and beam deflections introduced by radomes.

### Perpendicular polarization

The phase delay created by a homogeneous lossy solid dielectric sheet, for perpendicular polarization, is given by

$$\Delta p_{\perp} = T'_{n_{\perp}} - \frac{2\pi x}{\lambda} \cos \theta \quad (9)$$

### Parallel polarization

For parallel polarization, the equations are identical except for the subscripts.

Thus,

$$\Delta p_{\parallel} = T'_{n_{\parallel}} - \frac{2\pi x}{\lambda} \cos \theta \quad (10)$$

REPORT NO. NADC-EL-52195

APPLICATION OF TABLES TO COMPUTE THE  
TRANSMISSION AND REFLECTION COEFFICIENTS OF  
ANY MULTILAYER DIELECTRIC SANDWICH AT  
ARBITRARY INCIDENCE

Another useful application of these tables is the calculation of the transmission and reflection coefficients of multilayer plane dielectric sheets at arbitrary incidence by means of the method outlined in Report No. NADC EL-5293, reference (d). In reference (d), general equations for multilayer dielectric sandwiches were developed in terms of transmission and reflection coefficients of the individual layers taken as solid laminates in air, and hence are obtainable from these tables. The equations in reference (d), and the tables in this report may also be used to compute the transmission and reflection coefficients of glasses and plastic materials covered by optical coatings.

REPORT NO. NADC-EL-52195

REFERENCES

- (a) Report No. NADC EL-5116, "Theory of Lossy High-Incidence Radomes," 15 Jan 1952, by Samuel Wolin
- (b) Report No. ADC EL-123-50, "Electrical Design of Lossy High-Incidence Radomes," 11 Jul 1950, by Samuel Wolin
- (c) Report No. NADC EL-5104, "Tables of Fresnel's Coefficients, Snell's Law and Other Radome Design Quantities," 22 Jan 1952, by Samuel Wolin
- (d) Report No. NADC EL-5293, "Reflection and Transmission of Electromagnetic Waves by Multilayer Plane Dielectric Sheets at Arbitrary Incidence," 6 Aug 1952, by Samuel Wolin

**Aeronautical Electronic and Electrical Laboratory**

**REPORT NO. NADC-EL-52195**

**TABLES OF TRANSMISSION AND REFLECTION COEFFICIENTS OF  
LOSSY, HOMOGENEOUS DIELECTRIC SHEETS**

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52125

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\epsilon}$	$\frac{r}{\epsilon}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\epsilon}$	$\frac{T_n^2}{\epsilon}$	$\frac{T_n}{\epsilon}$	$\frac{R}{\epsilon}$	$\frac{R^2}{\epsilon}$	$\frac{R'}{\epsilon}$
0.00	0.00	0.05	1.0000	1.0000	0.3142	0.0000	0.0000	1.8850
		0.15	1.0000	1.0000	0.9425	0.0000	0.0000	2.5133
		0.25	1.0000	1.0000	1.5708	0.0000	0.0000	3.1416
		0.35	1.0000	1.0000	2.1991	0.0000	0.0000	3.7690
		0.45	1.0000	1.0000	2.8274	0.0000	0.0000	4.3982
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	1.0000	1.0000	3.4558	0.0000	0.0000	1.8850
		0.65	1.0000	1.0000	4.0841	0.0000	0.0000	2.5133
		0.75	1.0000	1.0000	4.7124	0.0000	0.0000	3.1416
		0.85	1.0000	1.0000	5.3407	0.0000	0.0000	3.7690
		0.95	1.0000	1.0000	5.9690	0.0000	0.0000	4.3982
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	1.0000	1.0000	6.5973	0.0000	0.0000	1.8850
		1.15	1.0000	1.0000	7.2257	0.0000	0.0000	2.5133
		1.25	1.0000	1.0000	7.8540	0.0000	0.0000	3.1416
		1.35	1.0000	1.0000	8.4823	0.0000	0.0000	3.7690
		1.45	1.0000	1.0000	9.1106	0.0000	0.0000	4.3982
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

		$ds = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{T_n^2}$	$\frac{T_n}{T_n^2}$	$\frac{R}{R^2}$	$\frac{R^1}{R^2}$	$\frac{R^1}{R^2}$
0.05	0.00	0.05	0.9992	0.9984	0.3142	0.0000	1.8874
		0.15	0.9976	0.9953	0.9425	0.0000	2.5152
		0.25	0.9961	0.9922	1.5708	0.0000	3.1416
		0.35	0.9945	0.9891	2.1991	0.0000	3.7659
		0.45	0.9930	0.9860	2.8274	0.0000	4.3765
		0.50	0.9922	0.9844	3.1416	0.0000	3.1416
		0.55	0.9914	0.9829	3.4558	0.0000	1.9115
		0.55	0.9899	0.9795	4.0841	0.0000	2.5207
		0.75	0.9883	0.9767	4.7124	0.0000	3.1416
		0.85	0.9867	0.9736	5.3407	0.0000	2.7602
		0.95	0.9852	0.9705	5.9690	0.0000	4.3523
		1.00	0.9844	0.9691	6.2832	0.0000	3.1416
		1.05	0.9836	0.9676	6.5973	0.0000	1.8857
		1.15	0.9821	0.9645	7.2257	0.0000	2.5264
		1.25	0.9806	0.9615	7.8540	0.0000	3.1416
		1.35	0.9790	0.9585	8.4823	0.0000	3.7545
		1.45	0.9775	0.9555	9.1106	0.0000	4.3783
		1.50	0.9767	0.9540	9.4248	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	0.05	0.9984	0.9984	0.9969	0.3142	0.0000	0.0000	1.9989
0.15	0.15	0.9953	0.9953	0.9906	0.9425	0.0000	0.0000	2.5167
0.25	0.25	0.9922	0.9922	0.9844	1.5708	0.0000	0.0000	3.1416
0.35	0.35	0.9891	0.9891	0.9782	2.1991	0.0000	0.0000	3.7619
0.45	0.45	0.9860	0.9860	0.9721	2.8274	0.0000	0.0000	4.3548
0.50	0.50	0.9844	0.9844	0.9691	3.1416	0.0000	0.0000	3.1416
0.55	0.55	0.9826	0.9826	0.9660	3.4558	0.0000	0.0000	1.9981
0.65	0.65	0.9798	0.9798	0.9600	4.0841	0.0000	0.0000	2.5281
0.75	0.75	0.9767	0.9767	0.9540	4.7124	0.0000	0.0000	3.1416
0.85	0.85	0.9736	0.9736	0.9480	5.3407	0.0000	0.0000	3.7505
0.95	0.95	0.9706	0.9706	0.9421	5.9690	0.0000	0.0000	4.3657
1.00	1.00	0.9691	0.9691	0.9391	6.2832	0.0000	0.0000	3.1416
1.05	1.05	0.9676	0.9676	0.9362	6.5973	0.0000	0.0000	1.9961
1.15	1.15	0.9645	0.9645	0.9303	7.2257	0.0000	0.0000	2.5395
1.25	1.25	0.9615	0.9615	0.9245	7.8540	0.0000	0.0000	3.1416
1.35	1.35	0.9585	0.9585	0.9187	8.4823	0.0000	0.0000	3.7391
1.45	1.45	0.9555	0.9555	0.9129	9.1106	0.0000	0.0000	4.2590
1.50	1.50	0.9540	0.9540	0.9101	9.8249	0.0000	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.000	.01	0.05	1.0000	1.0000	0.3142	0.0062	0.0000	1.8850
		0.15	0.9999	0.9997	0.9426	0.0162	0.0003	2.5134
		0.25	0.9998	0.9996	1.5708	0.0200	0.0004	3.1416
		0.35	0.9999	0.9997	2.1990	0.0152	0.0003	3.7698
		0.45	1.0000	1.0000	2.8274	0.0062	0.0000	4.3982
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	1.0000	1.0000	3.4558	0.0062	0.0000	1.8850
		0.65	0.9999	0.9997	4.0842	0.0162	0.0003	2.5134
		0.75	0.9998	0.9996	4.7124	0.0200	0.0004	3.1416
		0.85	0.9999	0.9997	5.3406	0.0162	0.0003	3.7698
		0.95	1.0000	1.0000	5.9690	0.0062	0.0000	4.3982
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	1.0000	1.0000	6.5974	0.0062	0.0000	1.8850
		1.15	0.9999	0.9997	7.2258	0.0162	0.0003	2.5134
		1.25	0.9998	0.9996	7.8540	0.0200	0.0004	3.1416
		1.25	0.9999	0.9997	8.4822	0.0162	0.0003	3.7698
		1.45	1.0000	1.0000	9.1106	0.0062	0.0000	4.3982
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2\theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub> '	R	R <sup>2</sup>	R'
.005	.01	0.05	0.9992	0.9984	0.3142	0.0052	0.0000	1.8874
		0.15	0.9975	0.9950	0.9426	0.0161	0.0003	2.5151
		0.25	0.9959	0.9918	1.5708	0.0199	0.0004	3.1416
		0.35	0.9944	0.9888	2.1990	0.0161	0.0003	3.7658
		0.45	0.9929	0.9859	2.8274	0.0061	0.0000	4.3754
		0.50	0.9922	0.9844	3.1416	0.0002	0.0000	3.1416
		0.55	0.9914	0.9828	3.4558	0.0061	0.0000	1.9116
		0.65	0.9897	0.9795	4.0842	0.0160	0.0003	2.5208
		0.75	0.9881	0.9763	4.7124	0.0198	0.0004	3.1416
		0.85	0.9866	0.9734	5.3406	0.0160	0.0003	3.7601
		0.95	0.9852	0.9706	5.9690	0.0061	0.0000	4.3523
		1.00	0.9844	0.9691	6.2832	0.0003	0.0000	3.1416
		1.05	0.9836	0.9675	6.5974	0.0061	0.0000	1.9357
		1.15	0.9820	0.9643	7.2258	0.0159	0.0003	2.5265
		1.25	0.9804	0.9611	7.8540	0.0136	0.0004	3.1416
		1.35	0.9789	0.9582	8.4822	0.0158	0.0003	3.7544
		1.45	0.9775	0.9554	9.1106	0.0061	0.0000	4.3282
		1.50	0.9767	0.9540	9.4248	0.0005	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$T_n$		$T_n^2$		$R$		$R^2$		$R'$	
$\frac{P}{.010}$	$\frac{r}{.91}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9984}$	$\frac{T_n^2}{0.9968}$	$\frac{T_n}{0.9426}$	$\frac{T_n^2}{1.5708}$	$\frac{T_n}{0.0160}$	$\frac{T_n}{0.0061}$	$\frac{T_n}{0.0003}$	$\frac{T_n}{0.0000}$	$\frac{T_n}{0.0000}$	$\frac{T_n}{1.8898}$	$\frac{T_n}{2.5168}$
0.05	0.9984	0.9968	0.3142	0.0062	0.0000	1.8898	0.0000	0.0000	0.0000	0.0000	0.0000	1.8898	2.5168
0.15	0.9952	0.9904	0.9426	0.0151	0.0003	3.1416	0.0003	0.0000	0.0000	0.0000	0.0000	3.1416	4.3547
0.25	0.9920	0.9840	1.5708	0.0198	0.0004	3.7616	0.0004	0.0000	0.0000	0.0000	0.0000	3.7616	5.0000
0.35	0.9888	0.9780	2.1490	0.0160	0.0003	4.3547	0.0003	0.0000	0.0000	0.0000	0.0000	4.3547	5.7616
0.45	0.9859	0.9721	2.8274	0.0061	0.0000	5.0000	0.0000	0.0000	0.0000	0.0000	0.0000	5.0000	6.3547
0.50	0.9844	0.9691	3.1416	0.0003	0.0000	5.7616	0.0000	0.0000	0.0000	0.0000	0.0000	5.7616	6.7616
0.55	0.9828	0.9660	3.4558	0.0061	0.0000	6.3547	0.0000	0.0000	0.0000	0.0000	0.0000	6.3547	7.1416
0.65	0.9797	0.9597	4.0842	0.0159	0.0003	7.1416	0.0003	0.0000	0.0000	0.0000	0.0000	7.1416	7.5282
0.75	0.9755	0.9536	4.7124	0.0195	0.0004	8.0000	0.0004	0.0000	0.0000	0.0000	0.0000	8.0000	8.1416
0.85	0.9735	0.9477	5.3406	0.0158	0.0002	8.7504	0.0002	0.0000	0.0000	0.0000	0.0000	8.7504	8.7504
0.95	0.9706	0.9420	5.9690	0.0060	0.0000	9.3066	0.0000	0.0000	0.0000	0.0000	0.0000	9.3066	9.3066
1.00	0.9691	0.9391	6.2832	0.0006	0.0000	9.862	0.0000	0.0000	0.0000	0.0000	0.0000	9.862	9.862
1.05	0.9675	0.9361	6.5974	0.0060	0.0000	10.416	0.0000	0.0000	0.0000	0.0000	0.0000	10.416	10.416
1.15	0.9644	0.9301	7.2258	0.0156	0.0002	11.168	0.0002	0.0000	0.0000	0.0000	0.0000	11.168	11.168
1.25	0.9613	0.9241	7.8540	0.0192	0.0004	12.000	0.0004	0.0000	0.0000	0.0000	0.0000	12.000	12.000
1.35	0.9584	0.9184	8.4822	0.0155	0.0002	12.7390	0.0002	0.0000	0.0000	0.0000	0.0000	12.7390	12.7390
1.45	0.9554	0.9129	9.1106	0.0060	0.0000	13.4200	0.0000	0.0000	0.0000	0.0000	0.0000	13.4200	13.4200
1.50	0.9540	0.9100	9.4243	0.0009	0.0000	13.7616	0.0000	0.0000	0.0000	0.0000	0.0000	13.7616	13.7616

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.000	.02	0.05	0.9999	0.9998	0.3144	0.0124	0.0002	1.8852
		0.15	0.9995	0.9990	0.9429	0.0324	0.0010	2.5137
		0.25	0.9992	0.9984	1.5708	0.0400	0.0016	3.1416
		0.35	0.9995	0.9990	2.1987	0.0324	0.0010	3.7695
		0.45	0.9994	0.9988	2.8272	0.0124	0.0002	4.3980
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9999	0.9998	3.4560	0.0124	0.0002	1.8852
		0.65	0.9995	0.9990	4.0845	0.0324	0.0010	2.5137
		0.75	0.9992	0.9984	4.7124	0.0400	0.0016	3.1416
		0.85	0.9995	0.9990	5.3403	0.0324	0.0010	3.7695
		0.95	0.9999	0.9998	5.9688	0.0124	0.0002	4.3980
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9999	0.9998	6.5876	0.0124	0.0002	1.8852
		1.15	0.9995	0.9990	7.2260	0.0324	0.0010	2.5137
		1.25	0.9992	0.9984	7.8540	0.0400	0.0016	3.1416
		1.35	0.9995	0.9990	8.4819	0.0324	0.0010	3.7695
		1.45	0.9999	0.9998	9.1104	0.0124	0.0002	4.3980
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.02}$	$\frac{ds}{.05}$	$\frac{T_n}{.9991}$	$\frac{T_n^2}{.9983}$	$\frac{T_n}{.9429}$	$\frac{R}{.0124}$	$\frac{R^2}{.0002}$	$\frac{R'}{1.8876}$
		0.05	0.9991	0.9983	0.3144	0.0124	0.0002	1.8876
		0.15	0.9971	0.9943	0.9429	0.0323	0.0010	2.5154
		0.25	0.9953	0.9906	1.5708	0.0398	0.0016	3.1416
		0.35	0.9940	0.9880	2.1987	0.0372	0.0010	3.7655
		0.45	0.9929	0.9858	2.8272	0.0123	0.0002	4.3760
		0.50	0.9922	0.9844	3.1416	0.0003	0.0000	3.1416
		0.55	0.9913	0.9827	3.4560	0.0123	0.0002	1.9119
		0.65	0.9893	0.9788	4.0844	0.0320	0.0010	2.5211
		0.75	0.9875	0.9752	4.7124	0.0335	0.0016	3.1416
		0.85	0.9862	0.9726	5.3403	0.0511	0.0010	3.7593
		0.95	0.9851	0.9704	5.9682	0.0122	0.0001	4.3921
		1.00	0.9844	0.9690	6.5962	0.0006	0.0000	3.1416
		1.05	0.9835	0.9674	6.5576	0.0122	0.0001	1.9359
		1.15	0.9816	0.9635	7.2260	0.0316	0.0010	2.5263
		1.25	0.9799	0.9600	7.8540	0.0392	0.0015	3.1416
		1.35	0.9785	0.9575	8.4819	0.0317	0.0010	3.7541
		1.45	0.9774	0.9553	9.1104	0.0121	0.0001	4.3980
		1.50	0.9767	0.9539	9.4248	0.0009	0.0000	3.1416

## REPORT NO. NADC-EL-52195

		$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$p = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$				
$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n''}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.010	.02	0.05	0.9984	0.9967	0.3144	0.0123	0.0002	1.8900
		0.15	0.9948	0.9896	0.9429	0.0322	0.0010	2.5171
		0.25	0.9914	0.9829	1.5708	0.0397	0.0015	3.1416
		0.35	0.9885	0.9772	2.1987	0.0320	0.0010	3.7616
		0.45	0.9859	0.9720	2.8272	0.0122	0.0001	4.3545
		0.50	0.9844	0.9690	3.1416	0.0006	0.0000	3.1416
		0.55	0.9828	0.9659	3.4560	0.0122	0.0001	1.9383
		0.65	0.9793	0.9590	4.0844	0.0317	0.0010	2.5285
		0.75	0.9760	0.9525	4.7124	0.0391	0.0015	3.1416
		0.85	0.9731	0.9470	5.3403	0.0315	0.0010	3.7502
		0.95	0.9705	0.9419	5.9688	0.0121	0.0001	4.3064
		1.00	0.9680	0.9391	6.2832	0.0012	0.0000	3.1416
		1.05	0.9675	0.9360	6.5976	0.0120	0.0001	1.9863
		1.15	0.9640	0.9293	7.2260	0.0312	0.0010	2.5309
		1.25	0.9608	0.9230	7.8540	0.0395	0.0015	3.1416
		1.35	0.9580	0.9177	8.4820	0.0311	0.0010	3.7329
		1.45	0.9554	0.9127	9.1104	0.0119	0.0001	4.3588
		1.50	0.9539	0.9100	9.4248	0.0018	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.01}$	$\frac{ds}{.05}$	$\frac{T_n}{.9998}$	$\frac{T_n^2}{.9997}$	$\frac{T_n}{.9998}$	$\frac{T_n^2}{.9997}$	$\frac{R}{.0186}$	$\frac{R^2}{.0003}$	$\frac{R'}{1.8855}$
0.15		0.15	0.9988	0.9976	0.9433	0.3147	0.0485	0.0024	2.5141
0.25		0.25	0.9982	0.9964	1.5708	1.5708	0.0599	0.0036	3.1416
0.35		0.35	0.9988	0.9976	2.1983	2.1983	0.0485	0.0024	3.7691
0.45		0.45	0.9998	0.9997	2.8269	2.8269	0.0186	0.0003	4.3977
0.50		0.50	1.0000	1.0000	3.1416	3.1416	0.0000	0.0000	1.5708
0.55		0.55	0.9998	0.9997	3.4563	3.4563	0.0186	0.0003	1.9855
0.65		0.65	0.9988	0.9976	4.0842	4.0842	0.0485	0.0024	2.5141
0.75		0.75	0.9982	0.9964	4.7124	4.7124	0.0599	0.0036	3.1416
0.85		0.85	0.9998	0.9997	5.3399	5.3399	0.0485	0.0024	3.7691
0.95		0.95	0.9998	0.9997	5.9685	5.9685	0.0186	0.0003	4.3977
1.00		1.00	1.0000	1.0000	6.2832	6.2832	0.0000	0.0000	1.5708
1.05		1.05	0.9998	0.9997	6.5979	6.5979	0.0186	0.0003	1.9855
1.15		1.15	0.9988	0.9976	7.2265	7.2265	0.0485	0.0024	2.5141
1.25		1.25	0.9982	0.9964	7.8540	7.8540	0.0599	0.0036	3.1416
1.35		1.35	0.9988	0.9976	8.4814	8.4814	0.0485	0.0024	3.7691
1.45		1.45	0.9998	0.9997	9.1101	9.1101	0.0186	0.0003	4.3977
1.50		1.50	1.0000	1.0000	9.4248	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$\frac{P}{\text{---}}$	$\frac{r}{\text{---}}$	$\frac{d_s}{\text{---}}$	$d_s = \frac{K}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$\frac{T_n^2}{\text{---}}$	$\frac{T_n'}{\text{---}}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$\frac{R^2}{\text{---}}$	$\frac{R'}{\text{---}}$
			$\frac{T_n}{\text{---}}$	$\frac{T_n^2}{\text{---}}$			$\frac{R}{\text{---}}$	$\frac{R^2}{\text{---}}$		
.005	.03	0.05	0.9990	0.9981	0.3147	0.0185	0.0003	1.8879		
		0.15	0.9965	0.9930	0.9433	0.0484	0.0023	2.5158		
		0.25	0.9943	0.9886	1.5708	0.0597	0.0036	3.1416		
		0.35	0.9933	0.9867	2.1983	0.0493	0.0023	3.7651		
		0.45	0.9928	0.9856	2.8269	0.0184	0.0003	4.3760		
		0.50	0.9922	0.9844	3.1416	0.0005	0.0000	5.1416		
		0.55	0.9912	0.9825	3.4563	0.0184	0.0003	1.0121		
		0.65	0.9887	0.9775	4.0849	0.0480	0.0023	2.5215		
		0.75	0.9865	0.9732	4.7124	0.0597	0.0035	3.1416		
		0.85	0.9856	0.9714	5.3399	0.0479	0.0023	3.7594		
		0.95	0.9850	0.9702	5.9685	0.0183	0.0003	4.3518		
		1.00	0.9844	0.9690	6.2832	0.0009	0.0000	3.1416		
		1.05	0.9834	0.9672	6.5979	0.0183	0.0003	1.9362		
		1.15	0.9810	0.9623	7.2265	0.0477	0.0023	2.5272		
		1.25	0.9788	0.9581	7.8540	0.0588	0.0035	3.1416		
		1.35	0.9779	0.9562	8.4815	0.0475	0.0023	3.7537		
		1.45	0.9773	0.9551	9.1101	0.0182	0.0003	4.3278		
		1.50	0.9767	0.9539	9.4248	0.0014	0.0000	3.1416		

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.010}$	$\frac{r}{.03}$	$\frac{ds}{.05}$	$\frac{T_n}{.9983}$	$\frac{T_n^2}{.9965}$	$\frac{T_n}{.9941}$	$\frac{T_n}{.9904}$	$\frac{T_n}{.9879}$	$\frac{T_n}{.9858}$	$\frac{T_n}{.9844}$	$\frac{T_n}{.9827}$	$\frac{T_n}{.9786}$	$\frac{T_n}{.9750}$	$\frac{T_n}{.9725}$	$\frac{T_n}{.9704}$	$\frac{T_n}{.9690}$	$\frac{T_n}{.9673}$	$\frac{T_n}{.9634}$	$\frac{T_n}{.9598}$	$\frac{T_n}{.9574}$	$\frac{T_n}{.9552}$	$\frac{T_n}{.9539}$	$\frac{R}{.0185}$	$\frac{R^2}{.0003}$	$\frac{R'}{1.8903}$
.05	.05	.05	.9983	.9965	.9941	.9904	.9879	.9858	.9844	.9827	.9786	.9750	.9725	.9704	.9690	.9673	.9634	.9598	.9574	.9552	.9539	.0185	.0003	1.8903
.15	.15	.15	.9941	.9883	.9841	.9804	.9760	.9717	.9690	.9657	.9614	.9577	.9540	.9506	.9473	.9440	.9407	.9374	.9341	.9308	.9275	.0483	.0023	2.5175
.25	.25	.25	.9904	.9809	.9708	.9609	.9510	.9411	.9312	.9213	.9114	.9015	.8916	.8817	.8718	.8619	.8520	.8421	.8322	.8223	.8124	.0595	.0035	3.1416
.35	.35	.35	.9879	.9760	.9649	.9538	.9427	.9316	.9205	.9094	.8983	.8872	.8761	.8650	.8539	.8428	.8317	.8206	.8095	.7984	.7873	.0480	.0023	3.7611
.45	.45	.45	.9858	.9717	.9569	.9421	.9273	.9125	.8977	.8829	.8681	.8533	.8385	.8237	.8089	.7941	.7793	.7645	.7497	.7349	.7201	.0183	.0003	4.3542
.50	.50	.50	.9844	.9690	.9538	.9386	.9234	.9082	.8930	.8778	.8626	.8474	.8322	.8170	.8018	.7866	.7714	.7562	.7410	.7258	.7106	.0009	.0000	3.1416
.55	.55	.55	.9827	.9657	.9487	.9317	.9147	.8977	.8807	.8637	.8467	.8297	.8127	.7957	.7787	.7617	.7447	.7277	.7107	.6937	.6767	.0183	.0003	1.9386
.65	.65	.65	.9786	.9577	.9358	.9139	.8920	.8699	.8479	.8259	.8039	.7819	.7599	.7379	.7159	.6939	.6719	.6499	.6279	.6059	.5839	.0476	.0023	2.5289
.75	.75	.75	.9750	.9506	.9252	.9000	.8747	.8494	.8241	.7988	.7735	.7482	.7229	.6976	.6723	.6470	.6217	.5964	.5711	.5458	.5205	.0586	.0034	3.1416
.85	.85	.85	.9725	.9458	.9181	.8904	.8627	.8350	.8073	.7796	.7519	.7242	.6965	.6688	.6411	.6134	.5857	.5580	.5303	.5026	.4749	.0473	.0022	3.7497
.95	.95	.95	.9704	.9417	.9120	.8823	.8526	.8229	.7932	.7635	.7338	.7041	.6744	.6447	.6150	.5853	.5556	.5259	.4962	.4665	.4368	.0181	.0003	4.3062
1.00	1.00	1.00	.9690	.9390	.9081	.8772	.8463	.8154	.7845	.7536	.7227	.6918	.6609	.6300	.5991	.5682	.5373	.5064	.4755	.4446	.4137	.0018	.0000	3.1416
1.05	1.05	1.05	.9673	.9357	.9031	.8705	.8379	.8053	.7727	.7401	.7075	.6749	.6423	.6097	.5771	.5445	.5119	.4793	.4467	.4141	.3815	.0181	.0003	1.9886
1.15	1.15	1.15	.9634	.9281	.8938	.8595	.8252	.7909	.7566	.7223	.6880	.6537	.6194	.5851	.5508	.5165	.4822	.4479	.4136	.3793	.3450	.0469	.0022	2.5403
1.25	1.25	1.25	.9598	.9213	.8828	.8443	.8058	.7673	.7288	.6903	.6518	.6133	.5748	.5363	.4978	.4593	.4208	.3823	.3438	.3053	.2668	.0577	.0033	3.1416
1.35	1.35	1.35	.9574	.9166	.8769	.8372	.7975	.7578	.7181	.6784	.6387	.5990	.5593	.5196	.4799	.4402	.4005	.3608	.3211	.2814	.2417	.0466	.0022	3.7383
1.45	1.45	1.45	.9552	.9125	.8728	.8331	.7934	.7537	.7140	.6743	.6346	.5949	.5552	.5155	.4758	.4361	.3964	.3567	.3170	.2773	.2376	.0179	.0003	4.2586
1.50	1.50	1.50	.9539	.9099	.8702	.8305	.7908	.7511	.7114	.6717	.6320	.5923	.5526	.5129	.4732	.4335	.3938	.3541	.3144	.2747	.2350	.0027	.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.04}$	$\frac{d_3}{.05}$	$\frac{T_n}{.9997}$	$\frac{T_n^2}{.9994}$	$\frac{T_n}{.3151}$	$\frac{R}{.0248}$	$\frac{R^2}{.0006}$	$\frac{R'}{1.8859}$
		0.05	0.9997	0.9994	0.3151	0.0248	0.0006	1.8859
		0.15	0.9979	0.9958	0.9440	0.0647	0.0042	2.5148
		0.25	0.9968	0.9936	1.5708	0.0799	0.0064	3.1416
		0.35	0.9979	0.9958	2.1976	0.0647	0.0042	3.7684
		0.45	0.9997	0.9994	2.8265	0.0248	0.0006	4.3973
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9997	0.9994	3.4567	0.0248	0.0006	1.8859
		0.65	0.9979	0.9958	4.0856	0.0647	0.0042	2.5148
		0.75	0.9968	0.9936	4.7124	0.0799	0.0064	3.1416
		0.85	0.9979	0.9958	5.3392	0.0647	0.0042	3.7684
		0.95	0.9997	0.9994	5.9681	0.0248	0.0006	4.3973
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9997	0.9994	6.5983	0.0248	0.0006	1.8859
		1.15	0.9979	0.9958	7.2272	0.0647	0.0042	2.5148
		1.25	0.9968	0.9936	7.8540	0.0799	0.0064	3.1416
		1.35	0.9979	0.9958	8.4808	0.0647	0.0042	3.7684
		1.45	0.9997	0.9994	9.1097	0.0248	0.0006	4.3973
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

**REPORT NO. NADC-EL-52195**

14

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52185

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.10	0.04	0.05	0.9981	0.9962	0.3151	0.0247	0.0006	1.8907
		0.15	0.9932	0.9865	0.9440	0.0644	0.0041	2.5182
		0.25	0.9890	0.9782	1.5708	0.0793	0.0063	3.1416
		0.35	0.9870	0.9742	2.1976	0.0640	0.0041	3.7604
		0.45	0.9856	0.9715	2.8265	0.0244	0.0006	4.3528
		0.50	0.9844	0.9690	3.1416	0.0012	0.0000	3.1416
		0.55	0.9825	0.9654	3.4567	0.0244	0.0006	1.9490
		0.65	0.9779	0.9560	4.0855	0.0534	0.0040	2.5206
		0.75	0.9737	0.9480	4.7124	0.0780	0.0061	3.1416
		0.85	0.9716	0.9441	5.3393	0.0630	0.0040	3.7491
		0.95	0.9702	0.9413	5.9681	0.0241	0.0006	4.2058
		1.00	0.9690	0.9389	6.2832	0.0024	0.0000	3.1416
		1.05	0.9672	0.9354	6.5982	0.0241	0.0006	1.9870
		1.15	0.9625	0.9265	7.2271	0.0625	0.0039	2.5409
		1.25	0.9585	0.9188	7.8540	0.0769	0.0059	3.1416
		1.35	0.9565	0.9149	8.4809	0.0821	0.0069	3.7377
		1.45	0.9551	0.9122	9.1098	0.0239	0.0006	4.2582
		1.50	0.9539	0.9098	9.4228	0.0036	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$T_n^2$		$T_n$		$\frac{R}{R'}$		$\frac{R^2}{R'^2}$		$\frac{R}{R'}$	
$\frac{P}{.001}$	$\frac{r}{.05}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9995}$	$\frac{T_n^2}{.9990}$	$\frac{T_n}{.9995}$	$\frac{T_n}{.9995}$	$\frac{T_n}{.9995}$	$\frac{R}{.0310}$	$\frac{R}{.0310}$	$\frac{R^2}{.0010}$	$\frac{R^2}{.0010}$	$\frac{R}{.0310}$	$\frac{R}{.0310}$
.000	.05	.05	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		.15	.9997	.9993	.9997	.9997	.9997	.0310	.0310	.0010	.0010	.0310	.0310
		.25	.9999	.9999	.9999	.9999	.9999	.0310	.0310	.0010	.0010	.0310	.0310
		.35	.9997	.9993	.9997	.9997	.9997	.0310	.0310	.0010	.0010	.0310	.0310
		.45	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		.55	1.0000	1.0000	1.0000	1.0000	1.0000	.0310	.0310	.0010	.0010	.0310	.0310
		.65	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		.75	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		.85	.9997	.9993	.9997	.9997	.9997	.0310	.0310	.0010	.0010	.0310	.0310
		.95	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		1.00	1.0000	1.0000	1.0000	1.0000	1.0000	.0310	.0310	.0010	.0010	.0310	.0310
		1.05	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		1.15	.9997	.9993	.9997	.9997	.9997	.0310	.0310	.0010	.0010	.0310	.0310
		1.25	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		1.35	.9997	.9993	.9997	.9997	.9997	.0310	.0310	.0010	.0010	.0310	.0310
		1.45	.9995	.9990	.9995	.9995	.9995	.0310	.0310	.0010	.0010	.0310	.0310
		1.50	1.0000	1.0000	1.0000	1.0000	1.0000	.0310	.0310	.0010	.0010	.0310	.0310

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

$\frac{P}{\epsilon}$	$\frac{r}{\epsilon}$	$\frac{d_s}{\epsilon}$	$\frac{T_n}{\epsilon}$	$\frac{T_n^2}{\epsilon}$	$\frac{T_n^3}{\epsilon}$	$\frac{R}{\epsilon}$	$\frac{R^2}{\epsilon}$	$\frac{R'}{\epsilon}$
0.05	0.05	0.05	0.9987	0.9975	0.9956	0.0309	0.0010	1.8888
0.15	0.15	0.0944	0.9944	0.9886	0.9448	0.0806	0.0065	2.5174
0.25	0.25	0.0911	0.9911	0.9823	1.5708	0.0994	0.0099	3.1415
0.35	0.35	0.9913	0.9913	0.9826	2.1966	0.0804	0.0065	3.7636
0.45	0.45	0.9925	0.9925	0.9850	2.8260	0.0308	0.0009	4.3750
0.50	0.50	0.9921	0.9921	0.9843	3.1415	0.0008	0.0000	3.1416
0.55	0.55	0.9909	0.9909	0.9819	3.4572	0.0307	0.0009	1.9130
0.65	0.65	0.9866	0.9866	0.9734	4.0864	0.0800	0.0064	2.5230
0.75	0.75	0.9834	0.9834	0.9671	4.7124	0.0986	0.0097	3.1416
0.85	0.85	0.9835	0.9835	0.9673	5.3384	0.0758	0.0057	3.7579
0.95	0.95	0.9847	0.9847	0.9696	5.9676	0.0305	0.0009	4.3500
1.00	1.00	0.9845	0.9845	0.9689	6.2832	0.0016	0.0000	3.1416
1.05	1.05	0.9831	0.9831	0.9665	6.5968	0.0305	0.0009	1.9371
1.15	1.15	0.9789	0.9789	0.9583	7.2280	0.0794	0.0063	2.5227
1.25	1.25	0.9756	0.9756	0.9521	7.8540	0.0978	0.0095	3.1416
1.35	1.35	0.9758	0.9758	0.9523	8.4800	0.0792	0.0063	3.7522
1.45	1.45	0.9769	0.9769	0.9544	9.1092	0.0303	0.0009	4.3269
1.50	1.50	0.9766	0.9766	0.9537	9.4242	0.0023	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.010}$	$\frac{r}{.05}$	$\frac{ds}{.05}$	$ds = \frac{\lambda}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$	$\frac{T_n}{.9979}$	$\frac{T_n^2}{.9959}$	$\frac{T_n}{.9448}$	$\frac{R}{.0309}$	$\frac{R^2}{.0010}$	$\frac{R'}{1.3515}$
		0.15	0.9920	0.9979	0.9959	0.9448	0.0805	0.0065	2.512
		0.25	0.9873	0.9979	0.9959	1.5708	0.0990	0.0098	3.1415
		0.35	0.9858	0.9979	0.9959	2.1968	0.0990	0.0098	3.1415
		0.45	0.9854	0.9979	0.9959	2.8260	0.0306	0.0009	4.3553
		0.50	0.9843	0.9979	0.9959	3.1416	0.0016	0.0000	3.1415
		0.55	0.9823	0.9979	0.9959	3.4572	0.0375	0.0000	1.9103
		0.65	0.9766	0.9979	0.9959	4.0864	0.0792	0.0063	2.512
		0.75	0.9720	0.9979	0.9959	4.7124	0.0975	0.0095	3.1415
		0.85	0.9705	0.9979	0.9959	5.3385	0.0728	0.0052	3.7123
		0.95	0.9700	0.9979	0.9959	5.9676	0.0302	0.0000	4.3553
		1.00	0.9689	0.9979	0.9959	6.2832	0.0031	0.0000	3.1415
		1.05	0.9670	0.9979	0.9959	6.5987	0.0301	0.0009	1.9103
		1.15	0.9614	0.9979	0.9959	7.2279	0.0781	0.0061	2.512
		1.25	0.9569	0.9979	0.9959	7.8540	0.0960	0.0092	3.1415
		1.35	0.9554	0.9979	0.9959	8.4801	0.0776	0.0060	3.7369
		1.45	0.9548	0.9979	0.9959	9.1093	0.0289	0.0009	4.2577
		1.50	0.9538	0.9979	0.9959	9.4248	0.0045	0.0000	3.1415

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$			
$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{R}{R^2}$	$\frac{R'}{R^2}$
.05	.05	0.9993	0.9986	0.0372	1.8871
.15	.15	0.9953	0.9906	0.0970	2.5167
.25	.25	0.9928	0.9857	0.1196	3.1416
.35	.35	0.9953	0.9906	0.0970	3.7655
.45	.45	0.9993	0.9986	0.0372	4.3861
.55	.55	1.0000	1.0000	0.0000	1.5708
.65	.65	0.9993	0.9986	0.0372	1.8871
.75	.75	0.9953	0.9906	0.0970	2.5167
.85	.85	0.9928	0.9857	0.1196	3.1416
.95	.95	0.9953	0.9906	0.0970	3.7655
1.00	1.00	0.9993	0.9986	0.0372	4.3861
1.05	1.05	1.0000	1.0000	0.0000	1.5708
1.15	1.15	0.9993	0.9986	0.0372	1.8871
1.25	1.25	0.9953	0.9906	0.0970	2.5167
1.35	1.35	0.9928	0.9857	0.1196	3.1416
1.45	1.45	0.9953	0.9906	0.0970	3.7655
1.50	1.50	0.9993	0.9986	0.0372	4.3861
1.55	1.55	1.0000	1.0000	0.0000	1.5708

## Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{r}$	$\frac{r}{d_s}$	$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R'}$
0.05	0.05	0.9985	0.9970	0.3163	0.0372	0.0014	1.8895	1.8895
0.15	0.15	0.9930	0.9859	0.9459	0.0957	0.0094	2.5184	2.5184
0.25	0.25	0.9890	0.9780	1.5708	0.1191	0.0142	3.1416	3.1416
0.35	0.35	0.9808	0.9708	2.1057	0.0964	0.0093	3.7625	3.7625
0.45	0.45	0.9672	0.9545	2.8253	0.0369	0.0014	4.3744	4.3744
0.50	0.50	0.9021	0.8843	3.1416	0.0009	0.0000	3.1416	3.1416
0.55	0.55	0.9007	0.8814	3.4578	0.0369	0.0014	1.9136	1.9136
0.65	0.65	0.8952	0.8706	4.0874	0.0960	0.0092	2.5240	2.5240
0.75	0.75	0.8913	0.8629	4.7124	0.1182	0.0140	3.1416	3.1416
0.85	0.85	0.8821	0.8546	5.3374	0.0957	0.0092	3.7565	3.7565
0.95	0.95	0.8744	0.8691	5.9670	0.0367	0.0013	4.3503	4.3503
1.00	1.00	0.8743	0.8689	6.2832	0.0019	0.0000	3.1416	3.1416
1.05	1.05	0.8729	0.8660	6.5994	0.0366	0.0013	1.9277	1.9277
1.15	1.15	0.8775	0.8555	7.2290	0.0953	0.0091	2.5297	2.5297
1.25	1.25	0.8737	0.8480	7.8540	0.1173	0.0138	3.1416	3.1416
1.35	1.35	0.8744	0.8496	8.4790	0.0950	0.0090	3.7512	3.7512
1.45	1.45	0.8767	0.8539	9.1086	0.0364	0.0013	4.3262	4.3262
1.50	1.50	0.8765	0.8537	9.4248	0.0028	0.0000	3.1416	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$				
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	0.06	0.05	0.9977	0.9955	0.3163	0.0371	0.0014	1.8919
0.15		0.15	0.9906	0.9813	0.9459	0.0965	0.0093	2.5201
0.25		0.25	0.9851	0.9704	1.5708	0.1186	0.0141	3.1416
0.35		0.35	0.9844	0.9691	2.1458	0.0959	0.0092	3.7586
0.45		0.45	0.9852	0.9705	2.8254	0.0367	0.0013	4.3527
0.50		0.50	0.9843	0.9689	3.1416	0.0019	0.0000	3.1416
0.55		0.55	0.9821	0.9645	3.4578	0.0366	0.0013	1.9401
0.65		0.65	0.9752	0.9510	4.0874	0.0930	0.0090	2.5514
0.75		0.75	0.9699	0.9406	4.7124	0.1159	0.0137	3.1416
0.85		0.85	0.9691	0.9392	5.3375	0.0945	0.0089	3.7473
0.95		0.95	0.9698	0.9404	5.9710	0.0333	0.0011	4.3087
1.00		1.00	0.9689	0.9387	6.2832	0.0037	0.0000	3.1416
1.05		1.05	0.9667	0.9345	6.5993	0.0362	0.0013	1.9887
1.15		1.15	0.9600	0.9217	7.2288	0.0936	0.0088	2.5427
1.25		1.25	0.9549	0.9117	7.8540	0.1151	0.0132	3.1416
1.35		1.35	0.9540	0.9102	8.4792	0.0931	0.0087	3.7360
1.45		1.45	0.9546	0.9112	9.1087	0.0359	0.0013	4.2571
1.50		1.50	0.9537	0.9095	9.4248	0.0054	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$T_n$		$T_n^2$		$T_n'$		$R$		$R^2$		$R'$	
$\frac{P}{.000}$	$\frac{r}{.07}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9991}$	$\frac{T_n^2}{.9981}$	$\frac{T_n'}{.9471}$	$\frac{R}{.0434}$	$\frac{R^2}{.0019}$	$\frac{R'}{1.8878}$							
		0.15	0.9936	0.9872	0.9471	0.1131	0.0128	2.5179							
		0.25	0.9902	0.9806	1.5708	0.1393	0.0194	3.1416							
		0.35	0.9868	0.9872	2.1945	0.1131	0.0128	3.7653							
		0.45	0.9991	0.9931	2.8245	0.0434	0.0019	4.3953							
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708							
		0.55	0.9991	0.9981	3.4586	0.0434	0.0019	1.8878							
		0.65	0.9936	0.9872	4.0987	0.1131	0.0128	2.5179							
		0.75	0.9902	0.9806	4.7124	0.1393	0.0194	3.1416							
		0.85	0.9936	0.9872	5.3361	0.1131	0.0128	3.7653							
		0.95	0.9991	0.9981	5.9661	0.0434	0.0019	4.3953							
		1.00	1.0000	1.0000	6.7832	0.0000	0.0000	1.5708							
		1.05	0.9991	0.9981	6.8002	0.0434	0.0019	1.8878							
		1.15	0.9936	0.9872	7.2303	0.1131	0.0128	2.5179							
		1.25	0.9902	0.9806	7.8540	0.1393	0.0194	3.1416							
		1.35	0.9936	0.9872	8.4776	0.1131	0.0128	3.7653							
		1.45	0.9991	0.9981	9.1077	0.0434	0.0019	4.3953							
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708							

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{r}$		$\frac{d_s}{r}$		$\frac{T_n}{\lambda}$		$\frac{T_n^2}{\lambda}$		$\frac{T_n'}{\lambda}$		$P = \frac{e \tan \delta}{e - \sin^2 \theta}$		$\frac{R}{R'}$		$\frac{R^2}{R'^2}$		$\frac{R'}{R}$	
0.05	0.07	0.05	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.15	0.07	0.15	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.25	0.07	0.25	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.35	0.07	0.35	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.45	0.07	0.45	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.50	0.07	0.50	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.55	0.07	0.55	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.65	0.07	0.65	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.75	0.07	0.75	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.85	0.07	0.85	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
0.95	0.07	0.95	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
1.00	0.07	1.00	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
1.05	0.07	1.05	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
1.15	0.07	1.15	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
1.25	0.07	1.25	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
1.35	0.07	1.35	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
1.45	0.07	1.45	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065
1.50	0.07	1.50	0.0083	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065	0.0065

## REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub> '	R	R <sup>2</sup>	R'
0.10	0.07	0.05	0.9975	0.9950	0.3170	0.0434	0.0019	1.8927
		0.15	0.9889	0.9780	0.9471	0.1126	0.0127	2.5213
		0.25	0.9826	0.9655	1.5708	0.1352	0.0191	3.1416
		0.35	0.9828	0.9658	2.1946	0.1119	0.0125	3.7574
		0.45	0.9849	0.9701	2.8246	0.0429	0.0018	4.3519
		0.50	0.9843	0.9688	3.1416	0.0022	0.0000	3.1416
		0.55	0.9813	0.9640	3.4585	0.0428	0.0018	1.9409
		0.65	0.9736	0.9478	4.0885	0.1108	0.0123	2.5326
		0.75	0.9674	0.9353	4.7124	0.1361	0.0185	3.1416
		0.85	0.9575	0.9360	5.3363	0.1102	0.0121	3.7461
		0.95	0.9595	0.9398	5.9663	0.0423	0.0018	4.3039
		1.00	0.9688	0.9385	6.2832	0.0043	0.0000	3.1416
		1.05	0.9664	0.9339	6.6001	0.0423	0.0018	1.9888
		1.15	0.9584	0.9186	7.2300	0.1092	0.0119	2.5438
		1.25	0.9525	0.9072	7.8540	0.1341	0.0180	3.1416
		1.35	0.9524	0.9072	8.4780	0.1086	0.0118	3.7349
		1.45	0.9542	0.9106	9.1080	0.0419	0.0018	4.2564
		1.50	0.9535	0.9093	9.4248	0.0063	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52105

$$d_s = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.00	0.00	0.05	0.9988	0.9975	0.3179	0.0497	0.0025	1.8887
		0.15	0.9916	0.9833	0.9485	0.1292	0.0167	2.5103
		0.25	0.9873	0.9747	1.5702	0.1590	0.0253	3.1416
		0.35	0.9816	0.9633	2.1030	0.1292	0.0167	3.7638
		0.45	0.9688	0.9375	2.8237	0.0497	0.0025	4.3844
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9688	0.9375	3.4595	0.0497	0.0025	1.8887
		0.65	0.9916	0.9833	4.0001	0.1292	0.0167	2.5103
		0.75	0.9873	0.9747	4.7124	0.1590	0.0253	3.1416
		0.85	0.9916	0.9833	5.3346	0.1292	0.0167	3.7638
		0.95	0.9988	0.9975	5.9652	0.0497	0.0025	4.3844
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9988	0.9975	6.6010	0.0497	0.0025	1.8887
		1.15	0.9916	0.9833	7.2317	0.1292	0.0167	2.5103
		1.25	0.9873	0.9747	7.8540	0.1590	0.0253	3.1416
		1.35	0.9916	0.9833	8.4762	0.1292	0.0167	3.7638
		1.45	0.9988	0.9975	9.1068	0.0497	0.0025	4.3844
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.005}$	$\frac{r}{.08}$	$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$	$\frac{T_n}{T_h}$	$\frac{T_n^2}{T_h^2}$	$\frac{T_h}{R}$	$\frac{R^2}{R'}$	$\frac{R'}{R^2}$
0.05	0.05	0.9980	0.9959	0.3179	0.0497	0.0025	1.8911
0.15	0.05	0.9893	0.9787	0.9485	0.1289	0.0166	2.5210
0.25	0.05	0.9825	0.9672	1.5708	0.1584	0.0251	3.1416
0.35	0.05	0.9862	0.9726	2.1831	0.1285	0.0165	3.7599
0.45	0.05	0.9917	0.9834	2.8237	0.0494	0.0024	4.2728
0.50	0.05	0.9921	0.9842	3.1416	0.0013	0.0000	3.1416
0.55	0.05	0.9901	0.9803	3.4595	0.0403	0.0024	1.9153
0.65	0.05	0.9816	0.9635	4.0900	0.1279	0.0164	2.5266
0.75	0.05	0.9759	0.9523	4.7124	0.1572	0.0247	3.1416
0.85	0.05	0.9745	0.9575	5.3344	0.1275	0.0163	3.7543
0.95	0.05	0.9838	0.9679	5.9654	0.0490	0.0024	4.3487
1.00	0.05	0.9842	0.9687	6.2832	0.0025	0.0000	3.1416
1.05	0.05	0.9823	0.9648	6.6010	0.0484	0.0024	1.0000
1.15	0.05	0.9739	0.9486	7.2315	0.1269	0.0161	2.5323
1.25	0.05	0.9683	0.9376	7.8540	0.1560	0.0243	3.1416
1.35	0.05	0.9709	0.9426	8.4765	0.1265	0.0160	3.7487
1.45	0.05	0.9760	0.9527	9.1070	0.0487	0.0024	4.3246
1.50	0.05	0.9764	0.9534	9.4248	0.0037	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.010	.08	0.05	0.9372	0.8784	0.3179	0.0496	0.0025	1.8936
		0.15	0.9870	0.9741	0.9485	0.1286	0.0165	2.5227
		0.25	0.9797	0.9597	1.5708	0.1578	0.0249	3.1416
		0.35	0.9803	0.9620	2.1932	0.1278	0.0163	3.7560
		0.45	0.9846	0.9694	2.8238	0.0490	0.0024	4.3511
		0.50	0.9842	0.9687	3.1416	0.0025	0.0000	3.1416
		0.55	0.9815	0.9633	3.4594	0.0489	0.0024	1.9417
		0.65	0.9717	0.9441	4.0899	0.1266	0.0160	2.5339
		0.75	0.9646	0.9304	4.7124	0.1554	0.0241	3.1416
		0.85	0.9656	0.9324	5.3349	0.1259	0.0158	3.7448
		0.95	0.9691	0.9392	5.9655	0.0484	0.0023	4.3031
		1.00	0.9687	0.9384	6.2832	0.0049	0.0000	3.1416
		1.05	0.9660	0.9332	6.6009	0.0483	0.0023	1.9896
		1.15	0.9566	0.9150	7.2313	0.1247	0.0156	2.5452
		1.25	0.9497	0.9020	7.8540	0.1531	0.0234	3.1416
		1.35	0.9506	0.9036	8.4767	0.1240	0.0154	3.7335
		1.45	0.9534	0.9098	9.1072	0.0480	0.0023	4.2556
		1.50	0.9534	0.9090	9.4248	0.0072	0.0001	3.1416

REPORT NO. NADC-EL-52195

23

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{.005}$	$\frac{r}{.00}$	$\frac{ds}{.05}$	$\frac{T_n}{.9976}$	$\frac{T_n^2}{.9953}$	$\frac{T_n'}{.93189}$	$\frac{R}{.0559}$	$\frac{R^2}{.0031}$	$\frac{R'}{1.8922}$
.005	.00	.05	.9976	.9953	.93189	.0559	.0031	1.8922
		.15	.9871	.9743	.95501	.0449	.0210	2.5226
		.25	.9801	.9607	1.5708	.0379	.0316	3.1416
		.35	.9840	.9683	2.1915	.0445	.0209	3.7583
		.45	.9913	.9827	2.8227	.0556	.0031	4.3714
		.50	.9921	.9842	3.1416	.0614	.0000	3.1416
		.55	.9807	.9796	3.4605	.0555	.0031	1.9162
		.65	.9704	.9592	4.0016	.0436	.0207	2.5282
		.75	.9726	.9659	4.7174	.0462	.0312	3.1416
		.85	.9763	.9532	5.3337	.0434	.0206	3.7527
		.95	.9835	.9672	5.9644	.0552	.0030	4.3477
		1.00	.9842	.9686	6.2937	.0628	.0000	3.1416
		1.05	.9819	.9641	6.6020	.0551	.0030	1.9403
		1.15	.9718	.9443	7.2331	.0427	.0204	2.5338
		1.25	.9651	.9314	7.8540	.0472	.0307	3.1416
		1.35	.9687	.9285	8.4749	.0423	.0202	3.7471
		1.45	.9757	.9519	9.1060	.0549	.0030	4.3337
		1.50	.9763	.9533	9.4248	.0642	.0000	3.1416

## REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.010}$	$\frac{r}{.09}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9968}$	$\frac{T_n^2}{.9937}$	$\frac{T_n'}{.3189}$	$\frac{R}{.0559}$	$\frac{R^2}{.0031}$	$\frac{R'}{1.8946}$
		0.15	0.9848	0.9698	0.9501	0.1446	0.0209	2.5243
		0.25	0.9764	0.9533	1.5708	0.1772	0.0314	3.1416
		0.35	0.9786	0.9577	2.1916	0.1437	0.0206	3.7544
		0.45	0.9842	0.9687	2.8228	0.0553	0.0031	4.3501
		0.50	0.9842	0.9686	3.1416	0.0028	0.0000	3.1416
		0.55	0.9811	0.9626	3.4604	0.0551	0.0030	1.9427
		0.65	0.9695	0.9399	4.0914	0.1424	0.0203	2.5355
		0.75	0.9614	0.9242	4.7124	0.1745	0.0305	3.1416
		0.85	0.9635	0.9282	5.3334	0.1415	0.0200	3.7432
		0.95	0.9687	0.9364	5.9645	0.0546	0.0030	4.3021
		1.00	0.9686	0.9362	6.2832	0.0055	0.0000	3.1416
		1.05	0.9656	0.9324	6.6018	0.0545	0.0030	1.9906
		1.15	0.9545	0.9110	7.2328	0.1403	0.0197	2.5467
		1.25	0.9466	0.8961	7.8540	0.1719	0.0296	3.1416
		1.35	0.9485	0.8997	8.4752	0.1394	0.0194	3.7321
		1.45	0.9534	0.9090	9.1062	0.0540	0.0029	4.2547
		1.50	0.9533	0.9087	9.4248	0.0082	0.0001	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\epsilon}$	$\frac{r}{\epsilon}$	$\frac{ds}{\epsilon}$	$\frac{T_n}{\epsilon}$	$\frac{T_n^2}{\epsilon}$	$\frac{T_n'}{\epsilon}$	$\frac{R}{\epsilon}$	$\frac{R^2}{\epsilon}$	$\frac{R'}{\epsilon}$
.005	.10	0.05	0.9981	0.9961	0.3201	0.0623	0.0039	1.8909
		0.15	0.9989	0.9740	0.9520	0.1613	0.0260	2.5228
		0.25	0.9992	0.9608	1.5706	0.1980	0.0392	3.1416
		0.35	0.9999	0.9740	2.1896	0.1613	0.0260	3.7604
		0.45	0.9981	0.9961	2.8215	0.0623	0.0039	4.3923
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9981	0.9961	3.4617	0.0623	0.0039	1.8909
		0.65	0.9969	0.9740	4.0936	0.1613	0.0260	2.5228
		0.75	0.9902	0.9608	4.7124	0.1980	0.0392	3.1416
		0.85	0.9869	0.9740	5.3312	0.1613	0.0260	3.7604
		0.95	0.9981	0.9961	5.9631	0.0623	0.0039	4.3923
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9981	0.9961	6.6033	0.0623	0.0039	1.8909
		1.15	0.9869	0.9740	7.2351	0.1613	0.0260	2.5228
		1.25	0.9802	0.9608	7.8540	0.1980	0.0392	3.1416
		1.35	0.9869	0.9740	8.4728	0.1613	0.0260	3.7604
		1.45	0.9981	0.9961	9.1047	0.0623	0.0039	4.3923
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$v = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.10}$	$\frac{ds}{.005}$	$\frac{T_n}{.9973}$	$\frac{T_n^2}{.9945}$	$\frac{T_n}{.9519}$	$\frac{R}{.0623}$	$\frac{R^2}{.0039}$	$\frac{R'}{1.8933}$
		0.15	0.9846	0.9694	0.9519	0.1609	0.0259	2.5244
		0.25	0.9764	0.9534	1.5708	0.1973	0.0389	3.1416
		0.35	0.9815	0.9634	2.1897	0.1604	0.0257	3.7565
		0.45	0.9909	0.9819	2.8216	0.0619	0.0038	4.3706
		0.50	0.9920	0.9841	3.1216	0.0016	0.0000	3.1416
		0.55	0.9803	0.9788	3.4616	0.0619	0.0038	1.9174
		0.65	0.9769	0.9544	4.0934	0.1407	0.0200	2.5300
		0.75	0.9680	0.9388	4.7124	0.1985	0.0393	3.1416
		0.85	0.9730	0.9485	5.3315	0.1502	0.0225	2.7510
		0.95	0.9830	0.9664	5.9523	0.0614	0.0038	4.3265
		1.00	0.9841	0.9685	6.2832	0.0031	0.0000	3.1416
		1.05	0.9815	0.9633	6.6031	0.0614	0.0038	1.9414
		1.15	0.9693	0.9396	7.2348	0.1585	0.0251	2.5355
		1.25	0.9615	0.9245	7.8540	0.1943	0.0377	3.1416
		1.35	0.9663	0.9338	8.4732	0.1580	0.0250	3.7454
		1.45	0.9752	0.9511	9.1050	0.0610	0.0037	4.3226
		1.50	0.9763	0.9531	9.4248	0.0046	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
0.05	0.10	0.05	0.9965	0.9965	0.9970	0.9961	0.0622	0.0039	1.8957
0.15	0.15	0.05	0.9823	0.9823	0.9649	0.9519	0.1605	0.0258	2.5261
0.25	0.25	0.05	0.9727	0.9727	0.9461	1.5708	0.1965	0.0386	3.1416
0.35	0.35	0.05	0.9762	0.9762	0.9529	2.1598	0.1596	0.0255	3.7526
0.45	0.45	0.05	0.9838	0.9838	0.9679	2.8217	0.0615	0.0038	4.3490
0.50	0.50	0.05	0.9841	0.9841	0.9685	3.1416	0.0051	0.0000	3.1416
0.55	0.55	0.05	0.9807	0.9807	0.9618	3.4615	0.0613	0.0038	1.9438
0.65	0.65	0.05	0.9671	0.9671	0.9352	4.0332	0.1591	0.0250	2.5372
0.75	0.75	0.05	0.9579	0.9579	0.9174	4.7124	0.1956	0.0375	3.1416
0.85	0.85	0.05	0.9411	0.9411	0.9236	5.3317	0.1572	0.0247	3.7415
0.95	0.95	0.05	0.9683	0.9683	0.9175	5.9534	0.0607	0.0037	4.3011
1.00	1.00	0.05	0.9685	0.9685	0.9379	6.2632	0.0061	0.0000	3.1416
1.05	1.05	0.05	0.9652	0.9652	0.9316	6.6020	0.0606	0.0037	1.9916
1.15	1.15	0.05	0.9521	0.9521	0.9065	7.2345	0.1558	0.0243	2.5483
1.25	1.25	0.05	0.9432	0.9432	0.8895	7.8540	0.1907	0.0364	3.1416
1.35	1.35	0.05	0.9442	0.9442	0.8950	8.4736	0.1549	0.0240	3.7304
1.45	1.45	0.05	0.9529	0.9529	0.9081	9.1057	0.0601	0.0036	4.2556
1.50	1.50	0.05	0.9531	0.9531	0.9084	9.4246	0.0091	0.0001	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.000}$	$\frac{r}{.11}$	$\frac{ds}{.05}$	$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$	$\frac{T_n}{.9976}$	$\frac{T_n^2}{.9953}$	$\frac{T_n}{.9539}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{.0687}$	$\frac{R^2}{.0047}$	$\frac{R'}{1.8921}$
		0.05	0.9976	0.9953	0.9539	0.0687	0.0687	0.0687	0.0047	1.8921
		0.15	0.9942	0.9686	0.9539	0.1773	0.1773	0.1773	0.0314	2.5247
		0.25	0.9761	0.9528	1.5708	0.2174	0.2174	0.2174	0.0472	3.1416
		0.35	0.9442	0.9686	2.1877	0.1773	0.1773	0.1773	0.0314	3.7584
		0.45	0.9976	0.9953	2.8203	0.0687	0.0687	0.0687	0.0047	4.3910
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	0.0000	0.0000	1.8921
		0.55	0.9976	0.9953	3.4629	0.0687	0.0687	0.0687	0.0047	1.8921
		0.65	0.9442	0.9686	4.0852	0.1773	0.1773	0.1773	0.0314	2.5247
		0.75	0.9761	0.9528	4.7124	0.2174	0.2174	0.2174	0.0472	3.1416
		0.85	0.9442	0.9686	5.3202	0.1773	0.1773	0.1773	0.0314	3.7584
		0.95	0.9976	0.9953	5.9616	0.0687	0.0687	0.0687	0.0047	4.3910
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	0.0000	0.0000	1.8921
		1.05	0.9976	0.9953	6.6046	0.0687	0.0687	0.0687	0.0047	1.8921
		1.15	0.9442	0.9686	7.2371	0.1773	0.1773	0.1773	0.0314	2.5247
		1.25	0.9761	0.9528	7.8540	0.2174	0.2174	0.2174	0.0472	3.1416
		1.35	0.9442	0.9686	8.4708	0.1773	0.1773	0.1773	0.0314	3.7584
		1.45	0.9976	0.9953	9.1034	0.0687	0.0687	0.0687	0.0047	4.3910
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	0.0000	0.0000	1.8921

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{r}$	$\frac{ds}{r}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
0.11	0.15	0.9988	0.9977	0.3213	0.0686	0.0047	1.8945
	0.15	0.9919	0.9840	0.9539	0.1769	0.0313	2.5264
	0.35	0.9724	0.9459	1.5706	0.2165	0.0469	3.1416
	0.35	0.9738	0.9581	2.1872	0.1763	0.0311	3.7546
	0.45	0.9609	0.9210	2.8204	0.0682	0.0046	4.3694
	0.50	0.9020	0.8140	3.1416	0.0017	0.0000	3.1416
	0.55	0.9289	0.8779	3.4628	0.0581	0.0046	1.9186
	0.65	0.9742	0.9491	4.0453	0.1755	0.0308	2.5319
	0.75	0.9649	0.9311	4.7124	0.2149	0.0462	3.1416
	0.95	0.9712	0.9432	5.3295	0.1750	0.0306	3.7420
	0.95	0.9826	0.9655	5.9621	0.0677	0.0046	4.3454
	1.00	0.9840	0.9683	6.2832	0.0034	0.0000	3.1416
	1.05	0.9817	0.9624	6.6043	0.0676	0.0046	1.9426
	1.15	0.9467	0.8944	7.2367	0.1742	0.0303	2.5375
	1.25	0.9576	0.9169	7.8570	0.2132	0.0455	3.1416
	1.35	0.9637	0.9226	8.4713	0.1737	0.0302	3.7435
	1.45	0.9747	0.9501	9.1032	0.0672	0.0045	4.3214
	1.50	0.9752	0.9529	9.4242	0.0051	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{\text{mic}}$	$\frac{r}{\text{in}}$	$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{R}$	$\frac{R'}{R}$
0.05		0.9960	0.9921	0.3213	0.0685	1.8989	0.0047	1.8989
0.15		0.9796	0.9595	0.9538	0.1765	2.5281	0.0311	2.5281
0.25		0.9686	0.9383	1.5708	0.2157	3.1416	0.0465	3.1416
0.35		0.9735	0.9477	2.1879	0.1754	3.7507	0.0308	3.7507
0.45		0.9834	0.9670	2.8205	0.0677	4.3478	0.0046	4.3478
0.50		0.9840	0.9683	3.1416	0.0034	5.1416	0.0000	5.1416
0.55		0.9802	0.9608	3.4627	0.0676	1.0450	0.0046	1.0450
0.65		0.9644	0.9301	4.0051	0.1734	2.5501	0.0302	2.5501
0.75		0.9539	0.9099	4.7124	0.2125	3.1416	0.0451	3.1416
0.85		0.9584	0.9186	5.3298	0.1726	3.7334	0.0298	3.7334
0.95		0.9678	0.9265	5.9623	0.0660	4.2000	0.0045	4.2000
1.00		0.9684	0.9377	6.2832	0.0068	5.1416	0.0000	5.1416
1.05		0.9647	0.9306	6.6041	0.0664	1.9925	0.0045	1.9925
1.15		0.9495	0.9015	7.2363	0.1712	2.5502	0.0293	2.5502
1.25		0.9393	0.8824	7.8540	0.2093	3.1416	0.0438	3.1416
1.35		0.9436	0.8904	8.4718	0.1702	3.7334	0.0290	3.7334
1.45		0.9524	0.9071	9.1043	0.0662	4.2525	0.0044	4.2525
1.50		0.9529	0.9081	9.4248	0.0100	5.1416	0.0001	5.1416

REPORT NO. NADC-EL-52195

37

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$				
$\frac{P}{.005}$	$\frac{r}{.12}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9964}$	$\frac{T_n''}{.9928}$	$\frac{T_n'''}{.9560}$	$\frac{R}{.0750}$	$\frac{R^2}{.0056}$	$\frac{R'}{1.8059}$
		0.05	0.9964	0.9928	0.9560	0.1928	0.0372	2.5086
		0.15	0.9789	0.9582	1.5708	0.2357	0.0556	3.1416
		0.25	0.9679	0.9368	2.1856	0.1422	0.0370	3.7524
		0.35	0.9758	0.9522	2.8190	0.0745	0.0056	4.3680
		0.45	0.9900	0.9801	3.1416	0.0019	0.0000	3.1416
		0.50	0.9920	0.9840	3.4642	0.0744	0.0055	1.9200
		0.55	0.9884	0.9769	4.0974	0.1914	0.0366	2.5341
		0.65	0.9713	0.9434	4.7124	0.2339	0.0547	3.1416
		0.75	0.9605	0.9227	5.3274	0.1908	0.0364	3.7460
		0.85	0.9682	0.9375	5.9607	0.0740	0.0055	4.3440
		0.95	0.9821	0.9645	6.2832	0.0038	0.0000	3.1416
		1.00	0.9840	0.9682	6.6056	0.0739	0.0055	1.9440
		1.05	0.9805	0.9614	7.2388	0.1899	0.0361	2.5395
		1.15	0.9637	0.9288	7.8540	0.2322	0.0539	3.1416
		1.25	0.9532	0.9087	8.4692	0.1893	0.0358	3.7414
		1.35	0.9607	0.9230	9.1024	0.0735	0.0054	4.3201
		1.45	0.9742	0.9491	9.4248	0.0056	0.0000	3.1416
		1.50	0.9761	0.9527				

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$p = \frac{d \tan \delta}{d - \sin^2\theta}$$

P	r	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.010	.12	0.05	0.9956	0.9912	0.3227	0.0749	0.0056	1.8983
		0.15	0.9766	0.9537	0.9560	0.1924	0.0370	2.5302
		0.25	0.9642	0.9297	1.5708	0.2348	0.0551	3.1416
		0.35	0.9705	0.9419	2.1858	0.1912	0.0366	3.7488
		0.45	0.9829	0.9660	2.8191	0.0740	0.0055	4.3464
		0.50	0.9840	0.9682	3.1416	0.0038	0.0000	3.1416
		0.55	0.9797	0.9598	3.4640	0.0758	0.0055	1.0453
		0.65	0.9615	0.9245	4.0072	0.1895	0.0359	2.5412
		0.75	0.9406	0.8917	4.7124	0.2313	0.0535	3.1416
		0.85	0.9555	0.9130	5.3278	0.1853	0.0355	3.7376
		0.95	0.9672	0.9355	5.0610	0.0721	0.0053	4.2085
		1.00	0.9682	0.9374	6.2832	0.0074	0.0001	3.1416
		1.05	0.9641	0.9295	6.6054	0.0730	0.0053	1.9941
		1.15	0.9466	0.8961	7.2384	0.1867	0.0348	2.5522
		1.25	0.9352	0.8746	7.8540	0.2279	0.0519	3.1416
		1.35	0.9408	0.8850	8.4698	0.1856	0.0344	3.7266
		1.45	0.9518	0.9059	9.1028	0.0724	0.0052	4.2512
		1.50	0.9527	0.9077	9.4248	0.0109	0.0001	3.1416

## REPORT NO. NADC-EL-52195

$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{P}{.000}$	$\frac{r}{.13}$	$\frac{ds}{.05}$	$\frac{T_n}{.9967}$	$\frac{T_n^2}{.9934}$	$\frac{T_n}{.3242}$
					$\frac{R}{.0815}$
					$\frac{R^2}{.0066}$
					$\frac{R'}{1.8950}$
0.05	0.13	0.05	0.9967	0.9934	0.3242
0.15		0.15	0.9779	0.9562	0.9585
0.25		0.25	0.9668	0.9346	1.5708
0.35		0.35	0.9779	0.9562	2.1831
0.45		0.45	0.9967	0.9934	2.8174
0.50		0.50	1.0000	1.0000	3.1416
0.55		0.55	0.9967	0.9934	3.4658
0.65		0.65	0.9779	0.9562	4.1001
0.75		0.75	0.9668	0.9346	4.7124
0.85		0.85	0.9779	0.9562	5.3247
0.95		0.95	0.9967	0.9934	5.9590
1.00		1.00	1.0000	1.0000	6.2832
1.05		1.05	0.9967	0.9934	6.6074
1.15		1.15	0.9779	0.9562	7.2417
1.25		1.25	0.9668	0.9346	7.8540
1.35		1.35	0.9779	0.9562	8.4663
1.45		1.45	0.9967	0.9934	9.1005
1.50		1.50	1.0000	1.0000	9.4248

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{\pi}$	$\frac{\pi}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	0.13	0.05	0.9959	0.9918	0.3242	0.0814	0.0066	1.8974
		0.15	0.9756	0.9518	0.9584	0.2087	0.0436	2.5309
		0.25	0.9631	0.9276	1.5708	0.2547	0.0649	3.1416
		0.35	0.9726	0.9459	2.1833	0.2081	0.0433	3.7501
		0.45	0.9895	0.9790	2.8175	0.0809	0.0055	4.3666
		0.50	0.9919	0.9839	3.1416	0.0021	0.0000	3.1416
		0.55	0.9879	0.9759	3.4656	0.0808	0.0065	1.9214
		0.65	0.9680	0.9371	4.0397	0.2071	0.0429	2.5364
		0.75	0.9558	0.9136	4.7124	0.2528	0.0639	3.1416
		0.85	0.9650	0.9313	5.3251	0.2065	0.0426	3.7445
		0.95	0.9815	0.9634	5.9533	0.0803	0.0064	4.3426
		1.00	0.9839	0.9680	6.2832	0.0041	0.0000	3.1416
		1.05	0.9799	0.9603	6.6071	0.0802	0.0064	1.9454
		1.15	0.9605	0.9227	7.2411	0.2056	0.0423	2.5416
		1.25	0.9486	0.8998	7.8540	0.2509	0.0630	3.1416
		1.35	0.9576	0.9169	8.4670	0.2050	0.0420	3.7392
		1.45	0.9736	0.9480	9.1010	0.0738	0.0044	4.3186
		1.50	0.9759	0.9525	9.4248	0.0061	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.010}$		$\frac{r}{.13}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{P}{.010}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
			0.05	0.9951	0.9902	0.3242	0.0813	0.0066	1.8998	
			0.15	0.9733	0.9474	0.9583	0.2083	0.0434	2.5325	
			0.25	0.9594	0.9205	1.5708	0.2538	0.0644	3.1416	
			0.35	0.9673	0.9356	2.1835	0.2070	0.0428	3.7463	
			0.45	0.9823	0.9649	2.8176	0.0804	0.0065	4.3450	
			0.50	0.9839	0.9680	3.1416	0.0041	0.0000	3.1416	
			0.55	0.9791	0.9587	3.4655	0.0801	0.0064	1.9478	
			0.65	0.9583	0.9184	4.0904	0.2051	0.0421	2.5435	
			0.75	0.9450	0.8930	4.7124	0.2500	0.0625	3.1416	
			0.85	0.9524	0.9070	5.3255	0.2039	0.0416	3.7354	
			0.95	0.9666	0.9343	5.9595	0.0794	0.0063	4.2072	
			1.00	0.9681	0.9371	6.2832	0.0080	0.0001	3.1416	
			1.05	0.9635	0.9283	6.6068	0.0792	0.0063	1.9955	
			1.15	0.9435	0.8902	7.2405	0.2021	0.0408	2.5544	
			1.25	0.9307	0.8662	7.8540	0.2463	0.0607	3.1416	
			1.35	0.9377	0.8792	8.4676	0.2009	0.0404	3.7244	
			1.45	0.9512	0.9047	9.1014	0.0786	0.0062	4.2499	
			1.50	0.9525	0.9073	9.4248	0.0119	0.0001	3.1416	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$P = \frac{\epsilon \tan \beta}{\epsilon - \sin^2\theta}$				
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.000	.14	0.05	0.9961	0.9923	0.3259	0.0879	0.0077	1.8967
		0.15	0.9743	0.9493	0.9610	0.2251	0.0507	2.5318
		0.25	0.9616	0.9246	1.5708	0.2746	0.0754	3.1416
		0.35	0.9743	0.9493	2.1806	0.2251	0.0507	3.7514
		0.45	0.9061	0.8023	2.8157	0.0879	0.0077	4.3865
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9061	0.8023	3.4675	0.0879	0.0077	1.8967
		0.65	0.9743	0.9493	4.1026	0.2251	0.0507	2.5318
		0.75	0.9616	0.9246	4.7124	0.2746	0.0754	3.1416
		0.85	0.9743	0.9493	5.3222	0.2251	0.0507	3.7514
		0.95	0.9961	0.9923	5.9573	0.0879	0.0077	4.3865
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9961	0.9923	6.6091	0.0879	0.0077	1.8967
		1.15	0.9743	0.9493	7.2442	0.2251	0.0507	2.5318
		1.25	0.9616	0.9246	7.8540	0.2746	0.0754	3.1416
		1.35	0.9743	0.9493	8.4638	0.2251	0.0507	3.7514
		1.45	0.9061	0.8023	9.0989	0.0879	0.0077	4.3865
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$ds = \frac{k}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.005	.14	0.05	0.9953	0.9907	0.3258	0.0878	0.0077	1.8991
		0.15	0.9721	0.9449	0.9609	0.2246	0.0504	2.5334
		0.25	0.9579	0.9176	1.5708	0.2735	0.0748	3.1416
		0.35	0.9691	0.9391	2.1288	0.2239	0.0501	3.7476
		0.45	0.9889	0.9779	2.8159	0.0873	0.0076	4.3649
		0.50	0.9919	0.9838	3.1416	0.0022	0.0000	3.1416
		0.55	0.9873	0.9747	3.4673	0.0872	0.0076	1.9230
		0.65	0.9646	0.9304	4.1022	0.2229	0.0497	2.5598
		0.75	0.9507	0.9039	4.7124	0.2715	0.0737	3.1416
		0.85	0.9616	0.9246	5.3227	0.2222	0.0494	3.7422
		0.95	0.9809	0.9622	5.9577	0.0867	0.0075	4.3610
		1.00	0.9838	0.9679	6.2832	0.0044	0.0000	3.1416
		1.05	0.9793	0.9591	6.6087	0.0866	0.0075	1.9430
		1.15	0.9571	0.9160	7.2435	0.2212	0.0489	2.5443
		1.25	0.9436	0.8903	7.8540	0.2695	0.0726	3.1416
		1.35	0.9541	0.9104	8.4645	0.2205	0.0486	3.7367
		1.45	0.9730	0.9467	9.0994	0.0861	0.0074	4.3171
		1.50	0.9758	0.9522	9.4248	0.0066	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T'_n}{\lambda}$	$P = \frac{e \tan \delta}{e - \sin^2 \theta}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.010	.14	0.05	0.9945	0.9891	0.3258	0.0878	0.0077	1.9015	
		0.15	0.9698	0.9405	0.9698	0.2241	0.0502	2.5351	
		0.25	0.9543	0.9107	1.5708	0.2726	0.0743	3.1416	
		0.35	0.9638	0.9289	2.1810	0.2227	0.0496	3.7438	
		0.45	0.9817	0.9638	2.8161	0.0867	0.0075	4.3434	
		0.50	0.9838	0.9679	3.1416	0.0044	0.0000	3.1416	
		0.55	0.9785	0.9575	3.4671	0.0863	0.0075	1.9494	
		0.65	0.9549	0.9118	4.1019	0.2207	0.0487	2.5459	
		0.75	0.9400	0.8836	4.7124	0.2685	0.0721	3.1416	
		0.85	0.9490	0.9005	5.3231	0.2194	0.0481	3.7320	
		0.95	0.9659	0.9330	5.9580	0.0856	0.0073	4.2956	
		1.00	0.9679	0.9368	6.2832	0.0087	0.0001	3.1416	
		1.05	0.9628	0.9270	6.6083	0.0855	0.0073	1.9970	
		1.15	0.9402	0.8839	7.2429	0.2174	0.0473	2.5567	
		1.25	0.9259	0.8572	7.8540	0.2646	0.0700	3.1416	
		1.35	0.9344	0.8730	8.4653	0.2162	0.0467	3.7221	
		1.45	0.9504	0.9033	9.0999	0.0848	0.0072	4.2484	
		1.50	0.9523	0.9058	9.4748	0.0128	0.0002	3.1416	

## REPORT NO. NADC-EL-52195

		$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan\delta}{\epsilon - \sin^2\theta}$					
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$	
.000	.15	0.05	0.9955	0.9911	0.3276	0.0944	0.0089	1.8984	
		0.15	0.9705	0.9419	0.9637	0.2410	0.0581	2.5345	
		0.25	0.9560	0.9139	1.5708	0.2934	0.0861	3.1416	
		0.35	0.9705	0.9419	2.1779	0.2410	0.0581	3.7487	
		0.45	0.9955	0.9911	2.8140	0.0944	0.0089	4.3848	
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708	
		0.55	0.9955	0.9911	3.4602	0.0944	0.0089	1.8984	
		0.65	0.9705	0.9419	4.1053	0.2410	0.0581	2.5345	
		0.75	0.9560	0.9139	4.7124	0.2934	0.0861	3.1416	
		0.85	0.9705	0.9419	5.3195	0.2410	0.0581	3.7487	
		0.95	0.9955	0.9911	5.9556	0.0944	0.0089	4.3848	
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708	
		1.05	0.9955	0.9911	6.6108	0.0944	0.0089	1.8984	
		1.15	0.9705	0.9419	7.2469	0.2410	0.0581	2.5345	
		1.25	0.9560	0.9139	7.8540	0.2934	0.0861	3.1416	
		1.35	0.9705	0.9419	8.4611	0.2410	0.0581	3.7487	
		1.45	0.9955	0.9911	9.0971	0.0944	0.0089	4.3848	
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

		$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
P	r	$\frac{ds}{\lambda}$	$\frac{T_n}{T_n^2}$	$\frac{T_n'}{T_n^2}$	$\frac{R}{R^2}$	$\frac{R'}{R^2}$	
0.05	.15	0.05	0.9947	0.9895	0.0943	0.0089	1.9008
		0.15	0.9683	0.9376	0.2404	0.0578	2.5361
		0.25	0.9524	0.9071	0.2923	0.0854	3.1416
		0.35	0.9652	0.9318	0.2997	0.0574	3.7449
		0.45	0.9882	0.9767	0.0938	0.0088	4.3632
		0.50	0.9918	0.9837	0.0024	0.0000	3.1416
		0.55	0.9867	0.9735	0.0936	0.0088	1.9248
		0.65	0.9678	0.9232	0.2386	0.0569	2.5415
		0.75	0.9453	0.8936	0.2901	0.0842	3.1416
		0.85	0.9578	0.9112	0.2379	0.0566	3.7395
		0.95	0.9803	0.9609	0.0931	0.0087	4.3393
		1.00	0.9837	0.9677	0.0047	0.0000	3.1416
		1.05	0.9787	0.9579	0.0929	0.0086	1.9487
		1.15	0.9534	0.9090	0.2368	0.0561	2.5469
		1.25	0.9382	0.8602	0.2880	0.0829	3.1416
		1.35	0.9505	0.9034	0.2361	0.0557	3.7341
		1.45	0.9723	0.9454	0.0925	0.0085	4.3154
		1.50	0.9757	0.9520	0.0071	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$			
$\frac{P}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{r}$	$\frac{T_n^2}{r}$	$\frac{T_n'}{r}$	$\frac{R}{r}$	$\frac{R^2}{r}$	$\frac{R'}{r}$
0.010	0.05	0.9939	0.9879	0.3276	0.0943	0.0089	1.9032
	0.15	0.9660	0.9332	0.9635	0.2389	0.0575	2.5377
	0.25	0.9488	0.9003	1.5708	0.2912	0.0848	3.1416
	0.35	0.9601	0.9217	2.1783	0.2384	0.0562	3.7411
	0.45	0.9811	0.9625	2.8143	0.0931	0.0087	4.3417
	0.50	0.9837	0.9677	3.1416	0.0047	0.0000	3.1416
	0.55	0.9779	0.9562	3.4686	0.0929	0.0085	1.9511
	0.65	0.9512	0.9048	4.1045	0.2362	0.0558	2.5485
	0.75	0.9347	0.8736	4.7124	0.2869	0.0823	3.1416
	0.85	0.9453	0.8936	5.3206	0.2345	0.0552	3.7304
	0.95	0.9652	0.9317	5.9564	0.0920	0.0085	4.2940
	1.00	0.9677	0.9365	6.2832	0.0093	0.0001	3.1416
	1.05	0.9621	0.9256	6.6099	0.0918	0.0084	1.9987
	1.15	0.9366	0.8772	7.2454	0.2328	0.0542	2.5392
	1.25	0.9207	0.8477	7.8540	0.2828	0.0800	3.1416
	1.35	0.9308	0.8664	8.4628	0.2314	0.0536	3.7196
	1.45	0.9497	0.9019	9.0983	0.0910	0.0083	4.2468
	1.55	0.9520	0.9063	9.4248	0.0138	0.0002	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$\frac{T_n}{T_n^2}$	$\frac{T_n'}{T_n^2}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$\frac{R}{R'}$	$\frac{R^2}{R'^2}$	$\frac{R'}{R}$
			$T_n$	$T_n^2$							
.000	.16	.05	0.9049	0.9898	0.3295	0.1010	0.0102	1.9003	0.1010	0.0102	1.9003
		.15	0.9665	0.9341	0.9666	0.2568	0.0659	2.5374	0.2568	0.0659	2.5374
		.25	0.9501	0.9026	1.5708	0.3120	0.0974	3.1416	0.3120	0.0974	3.1416
		.35	0.9665	0.9341	2.1750	0.2568	0.0659	3.7458	0.2568	0.0659	3.7458
		.45	0.9949	0.9898	2.8121	0.1010	0.0102	4.3829	0.1010	0.0102	4.3829
		.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708	0.0000	0.0000	1.5708
		.55	0.9949	0.9898	3.4711	0.1010	0.0102	1.9003	0.1010	0.0102	1.9003
		.65	0.9665	0.9341	4.1082	0.2568	0.0659	2.5374	0.2568	0.0659	2.5374
		.75	0.9501	0.9026	4.7124	0.3120	0.0974	3.1416	0.3120	0.0974	3.1416
		.85	0.9665	0.9341	5.2166	0.2568	0.0659	3.7458	0.2568	0.0659	3.7458
		.95	0.9949	0.9898	5.9537	0.1010	0.0102	4.3829	0.1010	0.0102	4.3829
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708	0.0000	0.0000	1.5708
		1.05	0.9949	0.9898	6.6127	0.1010	0.0102	1.9003	0.1010	0.0102	1.9003
		1.15	0.9665	0.9341	7.2498	0.2568	0.0659	2.5374	0.2568	0.0659	2.5374
		1.25	0.9501	0.9026	7.8540	0.3120	0.0974	3.1416	0.3120	0.0974	3.1416
		1.35	0.9665	0.9341	8.4581	0.2568	0.0659	3.7458	0.2568	0.0659	3.7458
		1.45	0.9949	0.9898	9.0953	0.1010	0.0102	4.3829	0.1010	0.0102	4.3829
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$									
$\frac{P}{.005}$	$\frac{r}{.16}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9941}$	$\frac{T_n^2}{.9882}$	$\frac{T_n}{.3295}$	$\frac{R}{.1009}$	$\frac{R^2}{.0102}$	$\frac{R'}{1.9027}$	
		0.15	0.9642	0.9297	0.9665	0.2562	0.0656	2.5300	
		0.25	0.9465	0.8959	1.5708	0.3109	0.0965	3.1416	
		0.35	0.9613	0.9240	2.1752	0.2554	0.0652	3.7420	
		0.45	0.9876	0.9753	2.8123	0.1003	0.0101	4.3513	
		0.50	0.9918	0.9836	3.1416	0.0026	0.0000	3.1416	
		0.55	0.9860	0.9722	3.4708	0.1001	0.0100	1.9027	
		0.65	0.9568	0.9155	4.1077	0.2542	0.0646	2.5444	
		0.75	0.9395	0.8827	4.7124	0.3086	0.0952	3.1416	
		0.85	0.9539	0.9099	5.3172	0.2535	0.0642	3.7357	
		0.95	0.9796	0.9595	5.9541	0.0995	0.0099	4.3374	
	1.00		0.9836	0.9675	6.2832	0.0051	0.0000	3.1416	
	1.05		0.9780	0.9564	6.6122	0.0994	0.0099	1.9027	
	1.15		0.9495	0.9015	7.2490	0.2523	0.0637	2.5497	
	1.25		0.9325	0.8696	7.8540	0.3063	0.0938	3.1416	
	1.35		0.9465	0.8959	8.4591	0.2516	0.0633	3.7314	
	1.45		0.9716	0.9440	9.0960	0.0989	0.0098	4.3126	
	1.50		0.9755	0.9517	9.4248	0.0075	0.0001	3.1416	

# Aeronautical Electronic and Electrical Laboratory

## REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.10	.16	0.05	0.9933	0.9866	0.3295	0.1008	0.0102	1.9051
		0.15	0.9620	0.9254	0.9664	0.7556	0.0653	2.5406
		0.25	0.9430	0.8893	1.5708	0.3097	0.0959	3.1416
		0.35	0.9561	0.9141	2.1755	0.2540	0.0645	3.7383
		0.45	0.9804	0.9611	2.8125	0.0996	0.0099	4.3398
		0.50	0.9836	0.9675	3.1416	0.0051	0.0000	3.1416
		0.55	0.9772	0.9548	3.4706	0.0993	0.0099	1.9529
		0.65	0.9473	0.8973	4.1073	0.2518	0.0634	2.5513
		0.75	0.9290	0.8631	4.7174	0.3052	0.0931	3.1416
		0.85	0.9414	0.8863	5.3178	0.2503	0.0626	3.7276
		0.95	0.9645	0.9302	5.9546	0.0983	0.0097	4.2922
		1.00	0.9675	0.9361	6.2832	0.0100	0.0001	3.1416
		1.05	0.9613	0.9241	6.6117	0.0981	0.0096	2.0005
		1.15	0.9327	0.8700	7.2481	0.2481	0.0615	2.5620
		1.25	0.9152	0.8376	7.8540	0.3008	0.0905	3.1416
		1.35	0.9270	0.8593	8.4601	0.2466	0.0608	3.7169
		1.45	0.9489	0.9003	9.0966	0.0973	0.0093	4.2450
		1.50	0.9517	0.9058	9.4248	0.0147	0.0002	3.1416

**REPORT NO. NADC-EL-52195**

$\frac{P}{.000}$	$\frac{r}{.17}$	$\frac{d_s}{.17}$	$\frac{T_n}{.9942}$	$\frac{T_n^2}{.9884}$	$\frac{T_n'}{.3316}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{.1076}$	$\frac{R^2}{.0116}$	$\frac{R'}{1.9023}$
0.05	0.15	0.9621	0.9942	0.9884	0.3316	0.1076	0.0116	1.9023	1.9023
0.15	0.25	0.9621	0.9942	0.9884	0.3316	0.2725	0.0743	2.5405	2.5405
0.25	0.35	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	3.1416	3.1416
0.35	0.45	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	3.7427	3.7427
0.45	0.50	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	4.3808	4.3808
0.50	0.55	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	1.5708	1.5708
0.55	0.65	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	1.9023	1.9023
0.65	0.75	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	2.5405	2.5405
0.75	0.85	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	3.1416	3.1416
0.85	0.95	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	3.7427	3.7427
1.00	1.00	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	4.3808	4.3808
1.05	1.05	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	1.5708	1.5708
1.15	1.15	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	1.9023	1.9023
1.25	1.25	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	2.5405	2.5405
1.35	1.35	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	3.1416	3.1416
1.45	1.45	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	3.7427	3.7427
1.50	1.50	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	4.3808	4.3808
1.50	1.50	0.9621	0.9942	0.9884	0.3316	0.3305	0.1092	1.5708	1.5708

## REPORT NO. NADC-EL-52195

		$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$		$T_n$		$T_n^2$		$T'_n$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda^2}$	$\frac{R'}{\lambda}$	$\frac{R'^2}{\lambda^2}$
0.05	.17	0.05	0.9934	0.9868	0.3315	0.1100	0.3315	0.1100	0.1075	0.0116	1.9047	0.0116
		0.15	0.9599	0.9215	0.9696	0.9400	0.9696	0.9696	0.2719	0.0739	2.5421	0.0739
		0.25	0.9403	0.8842	1.5708	1.5129	1.5708	1.5708	0.3292	0.1084	3.1416	0.1084
		0.35	0.9570	0.9158	2.1722	2.1129	2.1722	2.1722	0.2711	0.0735	3.7390	0.0735
		0.45	0.9869	0.9739	2.8103	2.7729	2.8103	2.8103	0.1066	0.0114	4.3593	0.0114
		0.50	0.9917	0.9835	3.1416	3.0967	3.1416	3.1416	0.0027	0.0000	3.1416	0.0000
		0.55	0.9852	0.9707	3.4728	3.4110	3.4728	3.4728	0.1066	0.0114	1.9286	0.0114
		0.65	0.9526	0.9074	4.1108	4.0100	4.1108	4.1108	0.2698	0.0728	2.5474	0.0728
		0.75	0.9334	0.8712	4.7124	4.5899	4.7124	4.7124	0.3268	0.1068	3.1416	0.1068
		0.85	0.9496	0.9018	5.3142	5.1339	5.3142	5.3142	0.2690	0.0724	3.7337	0.0724
		0.95	0.9786	0.9580	5.9522	5.7579	5.9522	5.9522	0.1060	0.0112	4.3355	0.0112
		1.00	0.9835	0.9673	6.2832	6.1119	6.2832	6.2832	0.0054	0.0000	3.1416	0.0000
		1.05	0.9772	0.9549	6.6142	6.4397	6.6142	6.6142	0.1059	0.0112	1.9525	0.0112
		1.15	0.9452	0.8935	7.2519	7.0549	7.2519	7.2519	0.2678	0.0717	2.5527	0.0717
		1.25	0.9265	0.8584	7.8540	7.6484	7.8540	7.8540	0.3244	0.1053	3.1416	0.1053
		1.35	0.9423	0.8880	8.4562	8.2306	8.4562	8.4562	0.2670	0.0713	3.7284	0.0713
		1.45	0.9708	0.9424	9.0940	8.8684	9.0940	9.0940	0.1053	0.0111	4.3117	0.0111
		1.50	0.9754	0.9514	9.4245	9.1989	9.4245	9.4245	0.0080	0.0001	3.1416	0.0001

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

P WIRE	r IN	ds IN	$d_s = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$		$T_n^2$	$T_n$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$R^2$	$R'$
			$T_n$	$T_n^2$			R	R'		
		0.05	0.9976	0.9852	0.3315	0.1674	0.0115	1.9671		
		0.15	0.9577	0.9172	0.9695	0.2713	0.0736	2.5437		
		0.25	0.9368	0.8777	1.5708	0.3280	0.1076	3.1416		
		0.35	0.9518	0.9060	2.1725	0.2696	0.0727	3.7353		
		0.45	0.9796	0.9596	2.8105	0.1061	0.0113	4.3379		
		0.50	0.9835	0.9673	3.1416	0.0054	0.0000	3.1416		
		0.55	0.9764	0.9533	3.4725	0.1058	0.0112	1.9549		
		0.65	0.9431	0.8894	4.1102	0.2672	0.0714	2.5543		
		0.75	0.9230	0.8520	4.7124	0.3233	0.1045	3.1416		
		0.85	0.9373	0.8785	5.3149	0.2556	0.0706	3.7247		
		0.95	0.9636	0.9286	5.9527	0.1047	0.0110	4.2903		
		1.00	0.9673	0.9357	6.2832	0.0106	0.0001	3.1416		
		1.05	0.9605	0.9225	6.6136	0.1045	0.0109	2.0024		
		1.15	0.9286	0.8623	7.2510	0.2633	0.0693	2.5649		
		1.25	0.9094	0.8270	7.8540	0.3186	0.1015	3.1416		
		1.35	0.9229	0.8518	8.4573	0.2618	0.0685	3.7141		
		1.45	0.9480	0.8987	9.0948	0.1037	0.0107	4.2432		
		1.50	0.9514	0.9052	9.4248	0.0157	0.0002	3.1416		

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.000}$	$\frac{r}{.18}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9935}$	$\frac{T_n^2}{.9870}$	$\frac{T_n}{.9730}$	$\frac{R}{.1142}$	$\frac{R^2}{.0130}$	$\frac{R'}{1.9045}$
		.05	.9935	.9870	.9730	.1142	.0130	1.9045
		.15	.99576	.99169	.9730	.2882	.0831	2.5438
		.25	.99372	.98784	1.5708	.3487	.1216	3.1416
		.35	.99576	.99169	2.1686	.2882	.0831	3.7394
		.45	.99335	.9870	2.8079	.1142	.0130	4.3787
		.50	1.0000	1.0000	3.1416	.0000	.0000	1.5708
		.55	.99335	.9870	3.4753	.1142	.0130	1.9045
		.65	.99576	.99169	4.1146	.2882	.0831	2.5438
		.75	.99372	.98784	4.7124	.3487	.1216	3.1416
		.85	.99576	.99169	5.3102	.2882	.0831	3.7394
		.95	.99335	.9870	5.9495	.1142	.0130	4.3787
		1.00	1.0000	1.0000	6.2832	.0000	.0000	1.5708
		1.05	.99335	.9870	6.6169	.1142	.0130	1.9045
		1.15	.99576	.99169	7.2562	.2882	.0831	2.5438
		1.25	.99372	.98784	7.8540	.3487	.1216	3.1416
		1.35	.99576	.99169	8.4518	.2882	.0831	3.7394
		1.45	.99335	.9870	9.0911	.1142	.0130	4.3787
		1.50	1.0000	1.0000	9.4248	.0000	.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.005}$	$\frac{r}{.18}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n^3}{\lambda}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	.18	0.05	0.9926	0.9853	0.3337	0.1141	0.0130	1.9069	1.9069
		0.15	0.9554	0.9127	0.9728	0.2876	0.0827	2.5453	2.5453
		0.25	0.9338	0.8720	1.5708	0.3474	0.1207	3.1416	3.1416
		0.35	0.9524	0.9071	2.1689	0.2867	0.0822	3.7357	3.7357
		0.45	0.9861	0.9724	2.8082	0.1134	0.0129	4.3572	4.3572
		0.50	0.9917	0.9934	3.1416	0.0029	0.0000	3.1416	3.1416
		0.55	0.9845	0.9692	3.4750	0.1132	0.0128	1.9307	1.9307
		0.65	0.9480	0.8988	4.1140	0.2864	0.0814	2.5506	2.5506
		0.75	0.9269	0.8592	4.7124	0.3449	0.1100	3.1416	3.1416
		0.85	0.9451	0.8933	5.3110	0.2845	0.0810	3.7305	3.7305
		0.95	0.9780	0.9564	5.9501	0.1126	0.0127	4.3334	4.3334
		1.00	0.9834	0.9671	6.2832	0.0057	0.0000	3.1416	3.1416
		1.05	0.9764	0.9533	6.6162	0.1124	0.0126	1.9546	1.9546
		1.15	0.9408	0.8851	7.2551	0.2832	0.0802	2.5558	2.5558
		1.25	0.9201	0.8455	7.8540	0.3424	0.1172	3.1416	3.1416
		1.35	0.9379	0.8796	8.4531	0.2824	0.0798	3.7253	3.7253
		1.45	0.9699	0.9408	9.0920	0.1118	0.0125	4.3096	4.3096
		1.50	0.9752	0.9510	9.4248	0.0065	0.0001	3.1416	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

		$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$				
$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T'_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.10	.18	0.05	0.9918	0.9837	0.3337	0.1140	0.0130	1.9093
		0.15	0.9532	0.9085	0.9727	0.2869	0.0823	2.5460
		0.25	0.9304	0.8656	1.5703	0.3462	0.1198	3.1416
		0.35	0.9473	0.8974	2.1693	0.2852	0.0813	3.7321
		0.45	0.9788	0.9580	2.8084	0.1126	0.0127	4.3259
		0.50	0.9834	0.9671	3.1416	0.0057	0.0000	3.1416
		0.55	0.9756	0.9517	3.4746	0.1123	0.0126	1.9570
		0.65	0.9386	0.8810	4.1134	0.2826	0.0799	2.5574
		0.75	0.9167	0.8404	4.7124	0.3412	0.1164	3.1416
		0.85	0.9329	0.8702	5.3116	0.2809	0.0799	3.7321
		0.95	0.9528	0.9269	5.9304	0.1112	0.0124	4.3259
		1.00	0.9671	0.9353	6.2832	0.0113	0.0001	3.1416
		1.05	0.9596	0.9208	6.6156	0.1110	0.0123	2.0044
		1.15	0.9243	0.8543	7.2541	0.2785	0.0776	2.5574
		1.25	0.9033	0.8159	7.8540	0.3363	0.1131	3.1416
		1.35	0.9186	0.8438	8.4543	0.2769	0.0767	3.7321
		1.45	0.9470	0.8969	9.0528	0.1101	0.0121	4.3259
		1.50	0.9511	0.9046	9.4248	0.0167	0.0003	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	0.10	0.05	0.9927	0.9854	0.3360	0.1209	0.0146	1.9068	1.9068
0.15	0.15	0.15	0.9527	0.9077	0.9764	0.3039	0.0923	2.5472	2.5472
0.25	0.25	0.25	0.9303	0.8655	1.5708	0.3668	0.1345	3.1416	3.1416
0.35	0.35	0.35	0.9527	0.9077	2.1652	0.3039	0.0923	3.7360	3.7360
0.45	0.45	0.45	0.9927	0.9854	2.8056	0.1209	0.0146	4.3764	4.3764
0.55	0.55	0.55	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708	1.5708
0.65	0.65	0.65	0.9927	0.9854	3.4776	0.1209	0.0146	1.9068	1.9068
0.75	0.75	0.75	0.9527	0.9077	4.1180	0.3039	0.0923	2.5472	2.5472
0.85	0.85	0.85	0.9303	0.8655	4.7124	0.3668	0.1345	3.1416	3.1416
0.95	0.95	0.95	0.9527	0.9077	5.3068	0.3039	0.0923	3.7360	3.7360
1.00	1.00	1.00	0.9927	0.9854	5.9472	0.1209	0.0146	4.3764	4.3764
1.05	1.05	1.05	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708	1.5708
1.15	1.15	1.15	0.9927	0.9854	6.6192	0.1209	0.0146	1.9068	1.9068
1.25	1.25	1.25	0.9527	0.9077	7.2596	0.3039	0.0923	2.5472	2.5472
1.35	1.35	1.35	0.9303	0.8655	7.8540	0.3668	0.1345	3.1416	3.1416
1.45	1.45	1.45	0.9527	0.9077	8.4484	0.3039	0.0923	3.7360	3.7360
1.50	1.50	1.50	0.9927	0.9854	9.0888	0.1209	0.0146	4.3764	4.3764
1.50	1.50	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708	1.5708

## REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$\frac{R}{R'}$		$\frac{R^2}{R'^2}$	
$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n^2}$	$\frac{R}{R'}$	$\frac{R^2}{R'^2}$	$\frac{R'}{R'^2}$
0.05	0.05	0.9918	0.9837	0.3360	0.1208	0.0146	1.9092
0.15	0.15	0.9505	0.9035	0.9763	0.3032	0.0919	2.5488
0.25	0.25	0.9269	0.8592	1.5708	0.3654	0.1335	3.1416
0.35	0.35	0.9476	0.8080	2.1655	0.3022	0.0913	3.7323
0.45	0.45	0.9853	0.9707	2.8059	0.1291	0.0144	4.3540
0.50	0.50	0.9916	0.9833	3.1416	0.0031	0.0000	3.1416
0.55	0.55	0.9836	0.9675	3.4772	0.1199	0.0144	1.9330
0.65	0.65	0.9423	0.8848	4.1173	0.3009	0.0905	2.5540
0.75	0.75	0.9202	0.8467	4.7124	0.3629	0.1316	3.1416
0.85	0.85	0.9404	0.8843	5.3077	0.3000	0.0900	3.7323
0.95	0.95	0.9771	0.9547	5.9078	0.1102	0.0142	4.3311
1.00	1.00	0.9833	0.9668	6.2832	0.0061	0.0000	3.1416
1.05	1.05	0.9755	0.9516	6.6185	0.1100	0.0142	1.9330
1.15	1.15	0.9361	0.8762	7.2584	0.2086	0.0432	2.5540
1.25	1.25	0.9135	0.8344	7.8540	0.3602	0.1297	3.1416
1.35	1.35	0.9332	0.8709	8.4498	0.2977	0.0886	3.7323
1.45	1.45	0.9600	0.9290	9.0498	0.1184	0.0140	4.3074
1.55	1.55	0.9750	0.9537	9.6498	0.0061	0.0001	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.010}$	$\frac{r}{.10}$	$\frac{ds}{.05}$	$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
0.05	0.05	0.05	0.9910	0.9910	0.9871	0.3359	0.1207	0.0146	0.0146	1.9116
0.15	0.15	0.15	0.9483	0.8994	0.8994	0.3761	0.3025	0.0915	0.0915	2.5503
0.25	0.25	0.25	0.9235	0.8529	0.8529	1.5708	0.3641	0.1326	0.1326	3.1416
0.35	0.35	0.35	0.9425	0.8884	0.8884	2.1659	0.3006	0.0904	0.0904	3.7287
0.45	0.45	0.45	0.9779	0.9563	0.9563	2.8062	0.1193	0.0142	0.0142	4.3335
0.50	0.50	0.50	0.9933	0.9658	0.9658	3.1416	0.0061	0.0000	0.0000	3.1416
0.55	0.55	0.55	0.9747	0.9500	0.9500	3.4768	0.1189	0.0141	0.0141	1.9592
0.65	0.65	0.65	0.9339	0.8722	0.8722	4.1167	0.2980	0.0888	0.0888	2.5607
0.75	0.75	0.75	0.9101	0.8282	0.8282	4.7124	0.3589	0.1288	0.1288	3.1416
0.85	0.85	0.85	0.9282	0.8616	0.8616	5.3085	0.2962	0.0877	0.0877	3.7183
0.95	0.95	0.95	0.9618	0.9251	0.9251	5.9485	0.1177	0.0139	0.0139	4.2861
1.00	1.00	1.00	0.9669	0.9348	0.9348	6.2832	0.0120	0.0001	0.0001	3.1416
1.05	1.05	1.05	0.9586	0.9190	0.9190	6.6178	0.1174	0.0138	0.0138	2.0065
1.15	1.15	1.15	0.9197	0.8458	0.8458	7.2573	0.2936	0.0862	0.0862	2.5711
1.25	1.25	1.25	0.8969	0.8043	0.8043	7.8540	0.3538	0.1252	0.1252	3.1416
1.35	1.35	1.35	0.9141	0.8355	0.8355	8.4511	0.2919	0.0852	0.0852	3.7079
1.45	1.45	1.45	0.9460	0.8949	0.8949	9.0907	0.1165	0.0136	0.0136	4.2391
1.50	1.50	1.50	0.9558	0.9040	0.9040	9.4248	0.0177	0.0003	0.0003	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

		$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$			
$\frac{P}{\text{---}}$	$\frac{r}{\text{---}}$	$\frac{d_s}{\text{---}}$	$\frac{T_n}{\text{---}}$	$\frac{T_n^2}{\text{---}}$	$\frac{T_n}{\text{---}}$	$\frac{R}{\text{---}}$	$\frac{R'}{\text{---}}$
.000	.20	0.05	0.9918	0.9837	0.3385	0.1277	1.9092
		0.15	0.9476	0.8980	0.9800	0.3194	2.5508
		0.25	0.9231	0.8521	1.5708	0.3846	3.1416
		0.35	0.9476	0.8980	2.1616	0.3194	3.7324
		0.45	0.9918	0.9837	2.8031	0.1277	4.3739
		0.50	1.0000	1.0000	3.1416	0.0000	1.5708
		0.55	0.9918	0.9837	3.4800	0.1277	1.9092
		0.65	0.9476	0.8980	4.1216	0.3194	2.5508
		0.75	0.9231	0.8521	4.7124	0.3846	3.1416
		0.85	0.9476	0.8980	5.3031	0.3194	3.7324
		0.95	0.9918	0.9827	5.9447	0.1277	4.3739
		1.00	1.0000	1.0000	6.2832	0.0000	1.5708
		1.05	0.9918	0.9837	6.6216	0.1277	1.9092
		1.15	0.9476	0.8980	7.2632	0.3194	2.5508
		1.25	0.9231	0.8521	7.8540	0.3846	3.1416
		1.35	0.9476	0.8980	8.4447	0.3194	3.7324
		1.45	0.9918	0.9837	9.0353	0.1277	4.3739
		1.50	1.0000	1.0000	9.4248	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.005}$	$\frac{r}{.20}$	$\frac{ds}{ds}$	$ds = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$	$\frac{T_r}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
		0.05	0.9910	0.9820	0.3384	0.1276	0.0163	1.9116		
		0.15	0.9454	0.8939	0.9799	0.3117	0.1016	2.5524		
		0.25	0.9197	0.8459	1.5708	0.3832	0.1469	3.1416		
		0.35	0.9426	0.8884	2.1620	0.3177	0.2010	3.7285		
		0.45	0.9844	0.9690	2.8035	0.1265	0.0161	4.3525		
		0.50	0.9015	0.9831	3.1416	0.0032	0.0000	5.1416		
		0.55	0.9827	0.9652	3.4795	0.1266	0.0160	1.9354		
		0.65	0.9382	0.9803	4.1204	0.3163	0.1000	2.5575		
		0.75	0.9131	0.8337	4.7124	0.3805	0.1443	3.1416		
		0.85	0.9354	0.8749	5.3041	0.3153	0.0994	3.7235		
		0.95	0.9762	0.9520	5.9455	0.1255	0.0155	4.3288		
		1.00	0.9831	0.9556	6.2832	0.0054	0.0000	3.1416		
		1.05	0.9745	0.9497	6.6208	0.1257	0.0158	1.9591		
		1.15	0.9311	0.8669	7.2619	0.3139	0.0986	2.5626		
		1.25	0.9065	0.8217	7.8540	0.3775	0.1427	3.1416		
		1.35	0.9232	0.8616	8.4463	0.3130	0.0980	3.7185		
		1.45	0.9681	0.9371	9.0274	0.1250	0.0156	4.2751		
		1.50	0.9742	0.9503	9.4245	0.0056	0.0001	3.1416		

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.010}$	$\frac{r}{.20}$	$\frac{ds}{.05}$	$\frac{T_n}{.9902}$	$\frac{T_n^2}{.9604}$	$\frac{T_n^3}{.9384}$	$\frac{R}{.1275}$	$\frac{R^2}{.0163}$	$\frac{R'}{1.9140}$
		0.15	0.9433	0.8898	0.8797	0.3180	0.1011	2.5539
		0.25	0.9164	0.8338	1.5708	0.3818	0.1458	3.1416
		0.35	0.8975	0.8750	2.1624	0.3161	0.0999	3.7252
		0.45	0.8770	0.8545	2.1034	0.1259	0.0159	4.3312
		0.55	0.8531	0.9666	3.1416	0.0064	0.0000	3.1416
		0.65	0.8237	0.9482	3.4792	0.1256	0.0158	1.9615
		0.75	0.7930	0.8530	4.1201	0.3132	0.0981	2.5642
		0.85	0.7632	0.8157	4.7124	0.3764	0.1417	3.1416
		0.95	0.7333	0.8325	5.3051	0.3124	0.0070	3.7149
		1.05	0.7038	0.9232	5.8462	0.1243	0.0154	4.2835
		1.15	0.6666	0.9344	6.2832	0.0127	0.0002	3.1416
		1.25	0.6576	0.9170	6.6200	0.1240	0.0154	2.0088
		1.35	0.6148	0.8370	7.2606	0.3087	0.0953	2.5745
		1.45	0.8901	0.7923	7.8540	0.3712	0.1378	3.1416
		1.55	0.9093	0.8268	8.4473	0.3059	0.0942	3.7046
		1.65	0.9449	0.8929	9.0885	0.1230	0.0151	4.2369
		1.75	0.9504	0.9033	9.4246	0.0187	0.0003	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.21}$	$\frac{ds}{.05}$	$\frac{T_n}{.9999}$	$\frac{T_n^2}{.9819}$	$\frac{T_n}{.9410}$	$\frac{R}{.1345}$	$\frac{R^2}{.0181}$	$\frac{R'}{.0112}$
		0.05	0.9999	0.9819	0.9410	0.1345	0.0181	1.0112
		0.15	0.9422	0.8878	0.9538	0.3349	0.1122	2.5546
		0.25	0.9155	0.8382	1.5708	0.4023	0.1618	3.1416
		0.35	0.9422	0.8878	2.1578	0.3349	0.1122	3.7286
		0.45	0.9009	0.8119	2.8006	0.1345	0.0181	4.3714
		0.55	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.65	0.9009	0.8119	3.4426	0.1345	0.0181	1.9118
		0.75	0.9422	0.8878	4.1254	0.3349	0.1122	2.5546
		0.85	0.9155	0.8382	4.7124	0.4023	0.1618	3.1416
		0.95	0.9422	0.8878	5.2994	0.3349	0.1122	3.7286
		1.00	0.9009	0.8119	5.9422	0.1345	0.0181	4.3714
		1.05	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9009	0.8119	6.6242	0.1345	0.0181	1.9118
		1.15	0.9422	0.8878	7.2670	0.3349	0.1122	2.5546
		1.25	0.9155	0.8382	7.8540	0.4023	0.1618	3.1416
		1.35	0.9422	0.8878	8.4409	0.3349	0.1122	3.7286
		1.45	0.9009	0.8119	9.0837	0.1345	0.0181	4.3714
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$\frac{P}{\lambda}$	$r$	$\frac{d_s}{\lambda}$	$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$\frac{T_n}{T_n^2}$	$\frac{T_n}{T_n^2}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$\frac{R^2}{R}$	$\frac{R'}{R}$
.005	.21	0.05	0.9901	0.9802	0.2410	0.9836	0.1344	0.0181	1.9142	2.5561
		0.15	0.9401	0.8838	0.9836	1.5708	0.3342	0.1117	3.1416	4.3263
		0.25	0.9122	0.8322	2.1582	2.8010	0.4008	0.1607	3.1416	4.3263
		0.35	0.9372	0.8734	2.1582	3.1416	0.3332	0.1110	3.1416	4.3263
		0.45	0.9834	0.9571	2.8010	3.1416	0.1336	0.0178	4.3263	5.5418
		0.50	0.9915	0.9830	3.1416	3.1416	0.0034	0.0000	3.1416	4.3263
		0.55	0.9918	0.9639	3.4221	4.1246	0.1334	0.0178	1.9379	2.5512
		0.65	0.9430	0.8704	4.1246	4.7124	0.3317	0.1100	3.1416	4.3263
		0.75	0.9057	0.8203	4.7124	5.3004	0.3950	0.1584	3.1416	4.3263
		0.85	0.9301	0.8651	5.3004	5.9430	0.3307	0.1003	2.7100	3.1416
		0.95	0.9752	0.9510	5.9430	6.6232	0.1326	0.0176	4.3263	5.5418
		1.00	0.9830	0.9563	6.6232	6.6232	0.0058	0.0000	3.1416	4.3263
		1.05	0.9736	0.9478	6.6232	7.2656	0.1324	0.0175	1.9379	2.5512
		1.15	0.9259	0.8872	7.2656	7.8540	0.3292	0.1024	3.1416	4.3263
		1.25	0.8992	0.8085	7.8540	8.4426	0.3952	0.1561	3.1416	4.3263
		1.35	0.9231	0.8320	8.4426	9.0850	0.3282	0.1077	3.1416	4.3263
		1.45	0.9670	0.9352	9.0850	9.6746	0.1317	0.0173	4.3263	5.5418
		1.50	0.9746	0.9499	9.6746	9.6746	0.0101	0.0001	3.1416	4.3263

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

P	r	$\frac{d_s}{r}$	$T_n$	$T_n^2$	$\frac{T_n}{T_n}$	$\frac{R}{\epsilon - \sin^2\theta}$	$\frac{R^2}{\epsilon - \sin^2\theta}$	$\frac{R'}{\epsilon - \sin^2\theta}$
.010	.21	0.15	0.9852	0.9706	0.3409	0.1343	0.0180	1.9166
		0.15	0.9379	0.8797	0.9834	0.3334	0.1112	2.5577
		0.25	0.9090	0.8262	1.5708	0.3994	0.1595	3.1416
		0.35	0.9322	0.8691	2.1586	0.3314	0.1098	3.7215
		0.45	0.9760	0.9526	2.8013	0.1327	0.0176	4.3287
		0.50	0.9830	0.9663	3.1416	0.0068	0.0000	3.1416
		0.55	0.9727	0.9452	3.4817	0.1323	0.0175	1.9640
		0.65	0.9238	0.8533	4.1238	0.3285	0.1079	2.5678
		0.75	0.8959	0.8027	4.7124	0.3938	0.1551	3.1416
		0.85	0.9181	0.8430	5.3015	0.3265	0.1066	3.7113
		0.95	0.9598	0.9211	5.9435	0.1309	0.0171	4.2814
		1.00	0.9664	0.9338	6.2832	0.0133	0.0002	3.1416
		1.05	0.9565	0.9150	6.6224	0.1306	0.0171	2.0112
		1.15	0.9098	0.8277	7.2642	0.3237	0.1048	2.5780
		1.25	0.8831	0.7798	7.8540	0.3883	0.1503	3.1416
		1.35	0.9042	0.8176	8.4443	0.3219	0.1036	3.7011
		1.45	0.9438	0.8908	9.0862	0.1295	0.0168	4.2345
		1.50	0.9500	0.9026	9.4248	0.0197	0.0004	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{e - \sin^2\theta}}{\lambda}$$

$$p = \frac{e \tan \delta}{e - \sin^2\theta}$$

$\frac{p}{.000}$	$\frac{r}{.22}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9899}$	$\frac{T_n^2}{.9800}$	$\frac{T_n}{.9878}$	$\frac{R}{.1414}$	$\frac{R^2}{.0200}$	$\frac{R'}{1.5708}$
.000	.22	.05	.9899	.9800	.9878	.1414	.0200	1.5708
		.15	.9366	.8772	.9878	.3504	.1228	2.5586
		.25	.9077	.8239	1.5708	.4197	.1761	3.1416
		.35	.9366	.8772	2.1538	.3504	.1228	3.7246
		.45	.9899	.9800	2.7978	.1414	.0200	4.3686
		.50	1.0000	1.0000	3.1416	.0000	.0000	1.5708
		.55	.9899	.9800	3.4854	.1414	.0200	1.9146
		.65	.9366	.8772	4.1294	.3504	.1228	2.5586
		.75	.9077	.8239	4.7124	.4197	.1761	3.1416
		.85	.9366	.8772	5.2954	.3504	.1228	3.7246
		.95	.9899	.9800	5.9394	.1414	.0200	4.3686
		1.00	1.0000	1.0000	6.2832	.0000	.0000	1.5708
		1.05	.9899	.9800	6.6269	.1414	.0200	1.9146
		1.15	.9366	.8772	7.2710	.3504	.1228	2.5586
		1.25	.9077	.8239	7.8540	.4197	.1761	3.1416
		1.35	.9366	.8772	8.4370	.3504	.1228	3.7246
		1.45	.9899	.9800	9.0810	.1414	.0200	4.3686
		1.50	1.0000	1.0000	9.4248	.0000	.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.22}$	$\frac{ds}{.05}$	$\frac{T_n}{.9991}$	$\frac{T_n^2}{.9983}$	$\frac{T_n'}{.3437}$	$\frac{R}{.1413}$	$\frac{R^2}{.0200}$	$\frac{R'}{1.9169}$
		0.05	0.9345	0.8733	0.9876	0.3436	0.1222	2.5601
		0.25	0.9044	0.8180	1.5708	0.4182	0.1749	3.1416
		0.35	0.9316	0.8680	2.1543	0.3485	0.1215	3.7211
		0.45	0.9824	0.9652	2.7983	0.1404	0.0197	4.3473
		0.50	0.9214	0.9829	3.1416	0.0036	0.0000	3.1416
		0.55	0.9808	0.9619	3.4848	0.1402	0.0197	1.9406
		0.65	0.9274	0.8601	4.1295	0.3469	0.1204	2.5651
		0.75	0.8980	0.8064	4.7124	0.4152	0.1724	3.1416
		0.85	0.9246	0.8549	5.2966	0.3459	0.1197	3.7161
		0.95	0.9741	0.9490	5.9403	0.1394	0.0194	4.3326
		1.00	0.9829	0.9560	6.2832	0.0071	0.0001	3.1416
		1.05	0.9725	0.9457	6.6259	0.1382	0.0194	1.9406
		1.15	0.9204	0.8471	7.2694	0.3444	0.1186	2.5701
		1.25	0.8916	0.7950	7.8540	0.4123	0.1700	3.1416
		1.35	0.9176	0.8420	8.4388	0.3434	0.1174	3.7110
		1.45	0.9659	0.9330	9.0824	0.1384	0.0192	4.3000
		1.50	0.9744	0.9495	9.4248	0.0106	0.0001	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.010	.22	0.05	0.9883	0.9767	0.3437	0.1412	0.0199	1.9193
		0.15	0.9324	0.8693	0.9874	0.3488	0.1216	2.5616
		0.25	0.9012	0.8122	1.5708	0.4167	0.1737	3.1416
		0.35	0.9267	0.8588	2.1548	0.3467	0.1202	3.7175
		0.45	0.9750	0.9506	2.7987	0.1395	0.0194	4.3260
		0.50	0.9829	0.9660	3.1416	0.0071	0.0001	3.1416
		0.55	0.9717	0.9441	3.4843	0.1391	0.0193	1.9566
		0.65	0.9183	0.8433	4.1276	0.3435	0.1181	2.5716
		0.75	0.8884	0.7833	4.7124	0.4109	0.1688	3.1416
		0.85	0.9127	0.8331	5.2977	0.3415	0.1167	3.7075
		0.95	0.9586	0.9190	5.9412	0.1375	0.0189	4.2788
		1.00	0.9661	0.9333	6.2832	0.0140	0.0002	3.1416
		1.05	0.9554	0.9128	6.6250	0.1373	0.0188	2.0137
		1.15	0.9044	0.8180	7.2679	0.3387	0.1147	2.5817
		1.25	0.8758	0.7670	7.8540	0.4052	0.1642	3.1416
		1.35	0.8989	0.8081	8.4406	0.3367	0.1134	3.6974
		1.45	0.9426	0.8885	9.0837	0.1361	0.0185	4.2321
		1.50	0.9496	0.9018	9.4248	0.0207	0.0004	3.1416

REPORT NO. NADC-EL-52195

$\frac{p}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{\sqrt{\epsilon - \sin^2 \theta}}$	$\frac{T_n^2}{\epsilon - \sin^2 \theta}$	$\frac{T_n}{\epsilon - \sin^2 \theta}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
0.00	0.23	0.9889	0.9780	0.9889	0.1484	0.0220	1.9174
0.05		0.9307	0.8663	0.9919	0.3657	0.1337	2.5627
0.15		0.8995	0.8091	1.5708	0.4359	0.1909	3.1416
0.35		0.9307	0.8663	2.1497	0.3657	0.1337	3.7204
0.45		0.9889	0.9780	2.7950	0.1484	0.0220	4.3658
0.50		1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55		0.9889	0.9780	3.4882	0.1484	0.0220	1.9174
0.55		0.9307	0.8663	4.1335	0.3657	0.1337	2.5627
0.75		0.8995	0.8091	4.7124	0.4359	0.1909	3.1416
0.85		0.9307	0.8663	5.2912	0.3657	0.1337	3.7204
0.95		0.9889	0.9780	5.9366	0.1484	0.0220	4.3658
1.00		1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05		0.9889	0.9780	6.6298	0.1484	0.0220	1.9174
1.15		0.9307	0.8663	7.2751	0.3657	0.1337	2.5627
1.25		0.8995	0.8091	7.8540	0.4359	0.1909	3.1416
1.35		0.9307	0.8663	8.4328	0.3657	0.1337	3.7204
1.45		0.9889	0.9780	9.0781	0.1484	0.0220	4.3658
1.50		1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	0.25	0.05	0.9881	0.9763	0.3466	0.1483	0.0220	1.9198
	0.15	0.05	0.9286	0.8623	0.9917	0.3649	0.1331	2.5642
	0.25	0.05	0.8063	0.6502	1.5703	0.4354	0.1895	3.1416
	0.35	0.05	0.9258	0.8571	2.1502	0.3638	0.1323	3.7170
	0.45	0.05	0.9914	0.9827	2.7954	0.1473	0.0217	4.3445
	0.50	0.05	0.9913	0.9827	3.1416	0.0038	0.0000	3.1416
	0.55	0.05	0.9797	0.9598	3.4876	0.1471	0.0216	1.9434
	0.65	0.05	0.9216	0.8494	4.1325	0.3622	0.1312	2.5692
	0.75	0.05	0.8000	0.6400	4.7124	0.4323	0.1869	3.1416
	0.85	0.05	0.9188	0.8442	5.2925	0.3611	0.1304	3.7120
	0.95	0.05	0.9730	0.9468	5.9375	0.1462	0.0214	4.3209
	1.00	0.05	0.9827	0.9657	6.2832	0.0075	0.0001	3.1416
	1.05	0.05	0.9714	0.9436	6.6287	0.1460	0.0213	1.9670
	1.15	0.05	0.9147	0.8366	7.2734	0.3593	0.1292	2.5741
	1.25	0.05	0.8837	0.7810	7.8540	0.4293	0.1843	3.1416
	1.35	0.05	0.9119	0.8316	8.4349	0.3594	0.1285	3.7071
	1.45	0.05	0.9648	0.9308	9.0797	0.1452	0.0211	4.2973
	1.50	0.05	0.9742	0.9491	9.4248	0.0111	0.0001	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	$\frac{d_s}{\lambda}$	$T_n$	$T_n^2$	$T_n$	R	$R^2$	R'
0.05	0.24	0.05	0.9878	0.9758	0.3497	0.1555	0.0242	1.9205
0.15		0.15	0.9246	0.8548	0.9962	0.3810	0.1452	2.5670
0.25		0.25	0.8911	0.7940	1.5708	0.4539	0.2060	3.1416
0.35		0.35	0.9246	0.8548	2.1453	0.3810	0.1452	3.7161
0.45		0.45	0.9878	0.9758	2.7919	0.1555	0.0242	4.3627
0.50		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55		0.55	0.9878	0.9758	3.4912	0.1555	0.0242	1.9205
0.65		0.65	0.9246	0.8548	4.1378	0.3810	0.1452	2.5670
0.75		0.75	0.8911	0.7940	4.7124	0.4539	0.2060	3.1416
0.85		0.85	0.9246	0.8548	5.2869	0.3810	0.1452	3.7161
0.95		0.95	0.9878	0.9758	5.9335	0.1555	0.0242	4.3627
1.00		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05		1.05	0.9878	0.9758	6.6328	0.1555	0.0242	1.9205
1.15		1.15	0.9246	0.8548	7.2794	0.3810	0.1452	2.5670
1.25		1.25	0.8911	0.7940	7.8540	0.4539	0.2060	3.1416
1.35		1.35	0.9246	0.8548	8.4285	0.3810	0.1452	3.7161
1.45		1.45	0.9878	0.9758	9.0751	0.1555	0.0242	4.3627
1.50		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	0.24	0.05	0.9270	0.8594	0.3496	0.1553	0.0241	1.9228
		0.15	0.9225	0.8510	0.9960	0.3801	0.1445	2.5685
		0.25	0.8880	0.7885	1.5708	0.4523	0.2046	3.1416
		0.35	0.9107	0.8459	2.1459	0.3790	0.1436	3.7127
		0.45	0.9802	0.9608	2.7925	0.1543	0.0238	4.3415
		0.50	0.9912	0.9825	3.1416	0.0040	0.0000	3.1416
		0.55	0.9785	0.9575	3.4906	0.1541	0.0237	1.9464
		0.65	0.9156	0.8383	4.1368	0.3773	0.1424	2.5734
		0.75	0.8818	0.7775	4.7124	0.4491	0.2017	3.1416
		0.85	0.9128	0.8332	5.2883	0.3762	0.1415	3.7078
		0.95	0.9718	0.9445	5.9346	0.1531	0.0235	4.3170
		1.00	0.9826	0.9654	6.2832	0.0079	0.0001	3.1416
		1.05	0.9702	0.9413	6.6316	0.1529	0.0234	1.9700
		1.15	0.9087	0.8257	7.2776	0.3745	0.1402	2.5753
		1.25	0.8756	0.7666	7.8540	0.4461	0.1990	3.1416
		1.35	0.9059	0.8207	8.4307	0.3734	0.1395	3.7029
		1.45	0.9636	0.9284	9.0768	0.1521	0.0231	4.2924
		1.50	0.9740	0.9486	9.4248	0.0117	0.0001	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

P	r	$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		
		$d_s$	$T_n$			$\frac{T_n^2}{T_n}$	$\frac{R}{R'}$	$\frac{R^2}{R'}$
0.10	0.24	0.05	0.9861	0.9725	0.3495	0.1552	0.0241	1.9252
		0.15	0.9204	0.8472	0.9958	0.3793	0.1438	2.5700
		0.25	0.8849	0.7830	1.5708	0.4507	0.2031	3.1416
		0.35	0.9144	0.8370	2.1465	0.3770	0.1421	3.7093
		0.45	0.9727	0.9461	2.7930	0.1533	0.0235	4.3203
		0.50	0.9826	0.9654	3.1416	0.0079	0.0001	3.1416
		0.55	0.9694	0.9396	3.4900	0.1528	0.0234	1.9723
		0.65	0.9066	0.8220	4.1357	0.3757	0.1397	2.5700
		0.75	0.8724	0.7613	4.7124	0.4445	0.1976	3.1416
		0.85	0.8119	0.6520	5.2807	0.3715	0.1380	3.6005
		0.95	0.8560	0.6142	5.9357	0.1512	0.0229	4.2733
1.00		1.00	0.8555	0.6321	6.2832	0.0155	0.0002	3.1416
		1.05	0.9529	0.6080	6.6305	0.1506	0.0228	2.0102
		1.15	0.8030	0.7975	7.2758	0.3684	0.1357	2.5896
		1.25	0.8603	0.7401	7.8540	0.4385	0.1923	3.1416
		1.35	0.8475	0.7879	8.4326	0.3663	0.1342	3.6896
		1.45	0.9400	0.8835	9.0783	0.1495	0.0224	4.2768
		1.50	0.9428	0.9001	9.4248	0.0220	0.0005	3.1416

## REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$T_h$		$T_h^2$		$\frac{T_h}{T_h}$		$\frac{R}{R}$		$\frac{R^2}{R^2}$		$\frac{R''}{R''}$	
$\frac{P}{.000}$	$\frac{r}{.75}$	$\frac{ds}{.05}$	$\frac{T_h}{.9867}$	$\frac{T_h^2}{0.9736}$	$\frac{T_h}{0.9867}$	$\frac{T_h^2}{0.9736}$	$\frac{T_h}{1.0000}$	$\frac{T_h}{0.9867}$	$\frac{T_h^2}{1.0000}$	$\frac{R}{0.1626}$	$\frac{R}{0.3962}$	$\frac{R^2}{0.0264}$	$\frac{R^2}{0.1570}$	$\frac{R''}{1.9236}$	$\frac{R''}{2.5715}$
		0.05	0.9867	0.9736	0.9867	0.9736	1.0000	0.9867	0.9736	0.1626	0.3962	0.0264	0.1570	1.9236	2.5715
		0.15	0.9182	0.8430	0.8824	0.7785	0.8824	0.8824	0.7785	0.4706	0.4706	0.2215	0.2215	3.1416	3.1416
		0.25	0.8824	0.7785	0.8824	0.7785	0.8824	0.8824	0.7785	0.3962	0.3962	0.1570	0.1570	3.7117	3.7117
		0.35	0.9182	0.8430	0.9182	0.8430	0.9182	0.9182	0.8430	0.1626	0.1626	0.0264	0.0264	4.3596	4.3596
		0.45	0.9867	0.9736	0.9867	0.9736	0.9867	0.9867	0.9736	0.0000	0.0000	0.0000	0.0000	1.5708	1.5708
		0.50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.1626	0.1626	0.0264	0.0264	1.9236	1.9236
		0.55	0.9867	0.9736	0.9867	0.9736	0.9867	0.9867	0.9736	0.3962	0.3962	0.1570	0.1570	2.5715	2.5715
		0.65	0.9182	0.8430	0.9182	0.8430	0.9182	0.9182	0.8430	0.4706	0.4706	0.2215	0.2215	3.1416	3.1416
		0.75	0.8824	0.7785	0.8824	0.7785	0.8824	0.8824	0.7785	0.3962	0.3962	0.1570	0.1570	3.7117	3.7117
		0.85	0.9182	0.8430	0.9182	0.8430	0.9182	0.9182	0.8430	0.1626	0.1626	0.0264	0.0264	4.3596	4.3596
		0.95	0.9867	0.9736	0.9867	0.9736	0.9867	0.9867	0.9736	0.0000	0.0000	0.0000	0.0000	1.5708	1.5708
		1.00	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.1626	0.1626	0.0264	0.0264	1.9236	1.9236
		1.05	0.9867	0.9736	0.9867	0.9736	0.9867	0.9867	0.9736	0.3962	0.3962	0.1570	0.1570	2.5715	2.5715
		1.15	0.9182	0.8430	0.9182	0.8430	0.9182	0.9182	0.8430	0.4706	0.4706	0.2215	0.2215	3.1416	3.1416
		1.25	0.8824	0.7785	0.8824	0.7785	0.8824	0.8824	0.7785	0.3962	0.3962	0.1570	0.1570	3.7117	3.7117
		1.35	0.9182	0.8430	0.9182	0.8430	0.9182	0.9182	0.8430	0.1626	0.1626	0.0264	0.0264	4.3596	4.3596
		1.45	0.9867	0.9736	0.9867	0.9736	0.9867	0.9867	0.9736	0.0000	0.0000	0.0000	0.0000	1.5708	1.5708
		1.50	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.1626	0.1626	0.0264	0.0264	1.9236	1.9236

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{a \tan \delta}{a - \sin 2\theta}$$

$$d_s = \frac{x \sqrt{a - \sin^2 \theta}}{\lambda}$$

$\lambda/\lambda_0$	$r$	$d_s$	$T_n$	$T_n^2$	$T_n$	$R$	$R^2$	$R'$
.005	.25	0.05	0.9853	0.9719	0.3528	0.1625	0.0264	1.9260
		0.15	0.9161	0.8393	1.0005	0.3953	0.1562	2.5730
		0.25	0.8793	0.7732	1.5708	0.4690	0.2199	3.1416
		0.35	0.9134	0.8342	2.1415	0.3941	0.1553	3.7093
		0.45	0.9790	0.9585	2.7893	0.1614	0.0260	4.3384
		0.50	0.9911	0.9824	3.1416	0.0042	0.0000	3.1416
		0.55	0.9773	0.9552	3.4937	0.1611	0.0260	1.9495
		0.65	0.9093	0.8269	4.1412	0.3924	0.1539	2.5772
		0.75	0.8732	0.7625	4.7124	0.4657	0.2169	3.1416
		0.85	0.9065	0.8218	5.2840	0.3912	0.1530	3.7035
		0.95	0.9776	0.9421	5.9315	0.1602	0.0256	4.3149
		1.00	0.9824	0.9651	6.2832	0.0082	0.0001	3.1416
		1.05	0.9689	0.9388	6.6347	0.1599	0.0256	1.9730
		1.15	0.9025	0.8144	7.2819	0.3895	0.1517	2.5826
		1.25	0.8672	0.7520	7.8540	0.4626	0.2140	3.1416
		1.35	0.8997	0.8095	8.4264	0.3883	0.1508	3.6986
		1.45	0.9623	0.9259	9.0738	0.1590	0.0253	4.2914
		1.50	0.9737	0.9481	9.4248	0.0122	0.0001	3.1416

## REPORT NO. NADC-EL-52195

$\frac{P}{.010}$	$\frac{R'}{.25}$	$\frac{ds}{\lambda}$	$\frac{T_n}{.9850}$	$\frac{T_n^2}{.9702}$	$\frac{T_n'}{.3527}$	$\frac{R}{.1623}$	$\frac{R^2}{.0264}$	$\frac{R'}{1.9283}$
		0.05	0.9141	0.8355	1.0002	0.3344	0.1155	2.5744
		0.25	0.8763	0.7678	1.5708	0.4673	0.2184	3.1416
		0.35	0.9086	0.8255	2.1421	0.3921	0.1537	3.7041
		0.45	0.9714	0.9437	2.7899	0.1603	0.0257	4.2172
		0.50	0.9824	0.9651	3.1416	0.0082	0.0001	3.1416
		0.55	0.9681	0.9372	3.4930	0.1598	0.0255	1.9754
		0.65	0.9004	0.8108	4.1400	0.3686	0.1510	2.5841
		0.75	0.8641	0.7467	4.7124	0.4610	0.2125	3.1416
		0.85	0.8950	0.8011	5.2854	0.3864	0.1493	3.6952
		0.95	0.9548	0.9117	5.9327	0.1581	0.0250	4.2703
		1.00	0.9652	0.9315	6.2832	0.0162	0.0003	3.1416
		1.05	0.9515	0.9054	6.6334	0.1577	0.0249	2.0222
		1.15	0.8870	0.7867	7.2749	0.3831	0.1468	2.5938
		1.25	0.8522	0.7262	7.8540	0.4545	0.2069	3.1416
		1.35	0.8816	0.7773	8.4287	0.3809	0.1451	3.6855
		1.45	0.9385	0.8808	9.0755	0.1563	0.0244	4.2239
		1.50	0.9483	0.8992	9.4248	0.0235	0.0006	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

P	r	$\frac{d_s}{\lambda}$	$T_n$	$T_n^2$	$T_n'$	R	$R^2$	R'
0.00	0.26	0.05	0.9855	0.9712	0.3562	0.1698	0.0288	1.9270
		0.15	0.9115	0.8309	1.0054	0.4113	0.1691	2.5762
		0.25	0.8734	0.7628	1.5708	0.4871	0.2372	3.1416
		0.35	0.9115	0.8309	2.1362	0.4113	0.1691	3.7070
		0.45	0.9855	0.9712	2.7854	0.1698	0.0288	4.3562
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9855	0.9712	3.4078	0.1698	0.0288	1.9270
		0.65	0.9115	0.8309	4.1470	0.4113	0.1691	2.5762
		0.75	0.8734	0.7628	4.7124	0.4871	0.2372	3.1416
		0.85	0.9115	0.8309	5.2778	0.4113	0.1691	3.7070
		0.95	0.9855	0.9712	5.9270	0.1698	0.0288	4.3562
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9855	0.9712	6.6394	0.1698	0.0288	1.9270
		1.15	0.9115	0.8309	7.2886	0.4113	0.1691	2.5762
		1.25	0.8734	0.7628	7.8540	0.4871	0.2372	3.1416
		1.35	0.9115	0.8309	8.4194	0.4113	0.1691	3.7070
		1.45	0.9855	0.9712	9.0686	0.1698	0.0288	4.3562
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.25}$	$\frac{ds}{.05}$	$\frac{T_n}{.9946}$	$\frac{T_n^2}{.9995}$	$\frac{T_n}{0.3561}$	$\frac{R}{0.1697}$	$\frac{R^2}{0.0288}$	$\frac{R'}{1.9293}$
0.15		0.05	0.9095	0.8271	1.0051	0.4103	0.1684	2.5776
0.25		0.25	0.8704	0.7575	1.5708	0.4854	0.2356	3.1416
0.35		0.35	0.9068	0.8222	2.1369	0.4091	0.1674	3.7027
0.45		0.45	0.9773	0.9560	2.7860	0.1686	0.0284	4.3351
0.50		0.50	0.9911	0.9822	3.1416	0.0043	0.0000	3.1416
0.55		0.55	0.9761	0.9527	3.4970	0.1683	0.0283	1.9528
0.65		0.65	0.9027	0.8149	4.1457	0.4073	0.1659	2.5823
0.75		0.75	0.8644	0.7472	4.7124	0.4821	0.2324	3.1416
0.85		0.85	0.9000	0.8100	5.2794	0.4061	0.1649	3.6989
0.95		0.95	0.9693	0.9395	5.9283	0.1672	0.0280	4.3116
1.00		1.00	0.9822	0.9647	6.2832	0.0086	0.0001	3.1416
1.05		1.05	0.9676	0.9362	6.6379	0.1670	0.0279	1.9762
1.15		1.15	0.8960	0.8028	7.2864	0.4044	0.1635	2.5871
1.25		1.25	0.8585	0.7370	7.8540	0.4789	0.2293	3.1416
1.35		1.35	0.8033	0.7980	8.4220	0.4032	0.1626	3.6042
1.45		1.45	0.9609	0.9233	9.0706	0.1660	0.0276	4.2882
1.50		1.50	0.9735	0.9476	9.4248	0.0128	0.0002	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.10	.26	0.05	0.9838	0.9678	0.3560	0.1695	0.0287	1.9317
		0.15	0.9074	0.8234	1.0048	0.4094	0.1676	2.5790
		0.25	0.8674	0.7524	1.5708	0.4838	0.2340	3.1416
		0.35	0.9020	0.8136	2.1376	0.4070	0.1657	3.7004
		0.45	0.9701	0.9411	2.7867	0.1674	0.0280	4.3140
		0.50	0.9822	0.9647	3.1416	0.0086	0.0001	3.1416
		0.55	0.9668	0.9346	3.4963	0.1669	0.0278	1.9786
		0.65	0.8940	0.7992	4.1445	0.4035	0.1628	2.5885
		0.75	0.8555	0.7319	4.7124	0.4773	0.2278	3.1416
		0.85	0.8886	0.7896	5.2810	0.4012	0.1609	3.6908
		0.95	0.9534	0.9090	5.9296	0.1651	0.0272	4.2672
		1.00	0.9648	0.9309	6.2832	0.0169	0.0003	3.1416
		1.05	0.9501	0.9027	6.6365	0.1647	0.0271	2.0253
		1.15	0.8807	0.7756	7.2843	0.3977	0.1582	2.5681
		1.25	0.8438	0.7119	7.8540	0.4709	0.2218	3.1416
		1.35	0.8754	0.7563	8.4244	0.3955	0.1564	3.6812
		1.45	0.9370	0.8780	9.0725	0.1632	0.0266	4.2200
		1.50	0.9478	0.8983	9.4248	0.0249	0.0006	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.000}$	$\frac{r}{.27}$	$\frac{d_g}{.05}$	$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$	$\frac{T_n}{.9842}$	$\frac{T_n^2}{.9685}$	$\frac{T_n}{.3597}$	$\frac{R}{.1771}$	$\frac{R^2}{.0314}$	$\frac{R'}{1.9305}$
	0.05	0.15	0.9046	0.9842	0.9685	0.3597	0.1771	0.0314	1.9305
	0.15	0.25	0.8641	0.9046	0.8183	1.0102	0.4263	0.1817	2.5810
	0.25	0.35	0.8183	0.8183	0.7467	1.5703	0.5033	0.2533	3.1416
	0.35	0.45	0.7467	0.7467	0.6642	2.1314	0.4263	0.1817	3.7022
	0.45	0.50	0.6642	0.6642	0.6118	2.7819	0.1771	0.0314	4.3527
	0.50	0.55	0.6118	0.6118	0.5685	3.1416	0.0000	0.0000	1.5708
	0.55	0.65	0.5685	0.5685	0.5230	3.5013	0.1771	0.0314	1.9305
	0.65	0.75	0.5230	0.5230	0.4712	4.1518	0.4263	0.1817	2.5810
	0.75	0.85	0.4712	0.4712	0.4263	4.7124	0.5033	0.2533	3.1416
	0.85	0.95	0.4263	0.4263	0.3811	5.2730	0.4263	0.1817	3.7022
	0.95	1.00	0.3811	0.3811	0.3469	5.9235	0.1771	0.0314	4.3527
	1.00	1.05	0.3469	0.3469	0.3126	6.2832	0.0000	0.0000	1.5708
	1.05	1.15	0.3126	0.3126	0.2783	6.6428	0.1771	0.0314	1.9305
	1.15	1.25	0.2783	0.2783	0.2440	7.2934	0.4263	0.1817	2.5810
	1.25	1.35	0.2440	0.2440	0.2100	7.8540	0.5033	0.2533	3.1416
	1.35	1.45	0.2100	0.2100	0.1761	8.4146	0.4263	0.1817	3.7022
	1.45	1.50	0.1761	0.1761	0.1422	9.0651	0.1771	0.0314	4.3527
	1.50		0.1422	0.1422	0.1083	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.27}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9833}$	$\frac{T_n^2}{.9669}$	$\frac{T_n^3}{.9596}$	$\frac{R}{.01770}$	$\frac{R^2}{.00313}$	$\frac{R'}{1.9328}$
		0.05	0.9833	0.9669	0.9596	0.01770	0.00313	1.9328
		0.15	0.9026	0.8147	1.0099	0.4253	0.1803	2.5824
		0.25	0.8612	0.7416	1.5708	0.5016	0.2516	3.1416
		0.35	0.8999	0.8098	2.1321	0.4241	0.1798	3.6989
		0.45	0.9764	0.9534	2.7826	0.1758	0.0309	4.3377
		0.50	0.9910	0.9820	3.1416	0.0045	0.0000	3.1416
		0.55	0.9747	0.9501	3.5004	0.1755	0.0308	1.9563
		0.65	0.8959	0.8026	4.1504	0.4222	0.1762	2.5871
		0.75	0.8553	0.7316	4.7124	0.4982	0.2482	3.1416
		0.85	0.8932	0.7978	5.2747	0.4210	0.1772	3.6943
		0.95	0.9679	0.9368	5.9249	0.1744	0.0304	4.3083
		1.00	0.9820	0.9644	6.2832	0.0090	0.0001	3.1416
		1.05	0.9662	0.9335	6.6413	0.1742	0.0303	1.9704
		1.15	0.8892	0.7907	7.2910	0.4191	0.1757	2.5918
		1.25	0.8405	0.7217	7.8540	0.4949	0.2449	3.1416
		1.35	0.8866	0.7360	8.4173	0.4179	0.1747	3.6896
		1.45	0.9594	0.9205	9.0673	0.1732	0.0300	4.2849
		1.50	0.9732	0.9471	9.4248	0.0134	0.0002	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$									
$\frac{P}{.010}$	$\frac{r}{.27}$	$\frac{ds}{.05}$	$\frac{T_n}{.9925}$	$\frac{T_n^2}{.9652}$	$\frac{T_n'}{.3595}$	$\frac{R}{.1768}$	$\frac{R^2}{.0313}$	$\frac{R'}{1.9351}$	
		0.15	0.9006	0.8110	1.0096	0.4244	0.1801	2.5838	
		0.25	0.8583	0.7366	1.5708	0.4999	0.2499	3.1416	
		0.35	0.8952	0.8014	2.1329	0.4219	0.1780	3.6957	
		0.45	0.9687	0.9384	2.7833	0.1745	0.0305	4.3106	
		0.50	0.9820	0.9644	3.1416	0.0090	0.0001	3.1416	
		0.55	0.9853	0.9319	3.4996	0.1740	0.0303	1.9819	
		0.65	0.8973	0.7812	4.1491	0.4182	0.1749	2.5932	
		0.75	0.8456	0.7168	4.7124	0.4933	0.2433	3.1416	
		0.85	0.8920	0.7779	5.2764	0.4158	0.1729	3.6863	
		0.95	0.9519	0.9061	5.9263	0.1721	0.0296	4.2639	
		1.00	0.9645	0.9302	6.2832	0.0177	0.0003	3.1416	
		1.05	0.9486	0.8998	6.6398	0.1717	0.0295	2.0285	
		1.15	0.8741	0.7641	7.2888	0.4123	0.1700	2.6026	
		1.25	0.8351	0.6974	7.8540	0.4869	0.2370	3.1416	
		1.35	0.8689	0.7550	8.4200	0.4100	0.1681	3.6768	
		1.45	0.9454	0.8750	9.0693	0.1702	0.0290	4.2177	
		1.50	0.9473	0.8973	9.4248	0.0260	0.0007	3.1416	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

$\frac{P}{.000}$	$\frac{r}{.28}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9828}$	$\frac{T_n^2}{.9659}$	$\frac{T_n}{.3633}$	$\frac{R}{.1845}$	$\frac{R^2}{.0341}$	$\frac{R'}{1.9341}$
		0.05	0.9828	0.9659	0.3633	0.1845	0.0341	1.9341
		0.15	0.8974	0.8054	1.0151	0.4412	0.1946	2.5859
		0.25	0.8546	0.7303	1.5708	0.5193	0.2697	3.1416
		0.35	0.8974	0.8054	2.1264	0.4412	0.1946	3.6972
		0.45	0.9828	0.9659	2.7783	0.1845	0.0341	4.3491
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9828	0.9659	3.5049	0.1845	0.0341	1.9341
		0.65	0.8974	0.8054	4.1567	0.4412	0.1946	2.5859
		0.75	0.8546	0.7303	4.7124	0.5193	0.2697	3.1416
		0.85	0.8974	0.8054	5.2680	0.4412	0.1946	3.6972
		0.95	0.9828	0.9659	5.9199	0.1845	0.0341	4.3491
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9828	0.9659	6.6465	0.1845	0.0341	1.9341
		1.15	0.8974	0.8054	7.2983	0.4412	0.1946	2.5859
		1.25	0.8546	0.7303	7.8540	0.5193	0.2697	3.1416
		1.35	0.8974	0.8054	8.4096	0.4412	0.1946	3.6972
		1.45	0.9828	0.9659	9.0615	0.1845	0.0341	4.3491
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.28}$	$\frac{ds}{.15}$	$\frac{T_n}{.9820}$	$\frac{T_n^2}{.9642}$	$\frac{T_n}{1.0148}$	$\frac{T_n^2}{1.0302}$	$\frac{R}{0.1844}$	$\frac{R^2}{0.0340}$	$\frac{R'}{1.9365}$
.005	.28	.15	.9820	.9642	1.0148	1.0302	0.1844	0.0340	1.9365
		.15	.8954	.8018	1.0148	1.0302	0.4402	0.1938	2.5873
		.25	.8517	.7255	1.5708	2.4673	0.5176	0.2679	3.1416
		.35	.8928	.7971	2.1272	4.5248	0.4389	0.1926	3.6940
		.45	.9750	.9506	2.7790	7.6222	0.1831	0.0335	4.3281
		.50	.9909	.9818	3.1416	9.8683	0.0047	0.0000	3.1416
		.55	.9733	.9473	3.5040	12.2784	0.1828	0.0334	1.9598
		.65	.8888	.7900	4.1553	17.2653	0.4370	0.1909	2.5919
		.75	.8460	.7153	4.7124	22.2024	0.5141	0.2643	3.1416
		.85	.8862	.7853	5.2699	27.6704	0.4357	0.1898	3.6894
		.95	.9664	.9340	5.9214	35.0594	0.1917	0.0330	4.3047
		1.00	.9818	.9640	6.2832	39.4784	0.0094	0.0001	3.1416
		1.05	.9647	.9307	6.6448	43.9504	0.1814	0.0329	1.9831
		1.15	.8823	.7784	7.2958	53.2384	0.4328	0.1882	2.5966
		1.25	.8403	.7062	7.8540	61.6784	0.5107	0.2608	3.1416
		1.35	.8796	.7738	8.4126	70.7684	0.4326	0.1871	3.6848
		1.45	.9574	.9176	9.0638	82.1584	0.1804	0.0325	4.2814
		1.55	.9720	.9445	9.4248	88.8284	0.0130	0.0002	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$									
$ds = \frac{\lambda \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$									
$\frac{P}{.010}$	$\frac{r}{.28}$	$\frac{ds}{.05}$	$\frac{T_n}{.05}$	$\frac{T_n^2}{.05}$	$\frac{T_n}{.05}$	$\frac{R}{.05}$	$\frac{R^2}{.05}$	$\frac{R'}{.05}$	
.010	.28	.05	0.9811	0.9625	0.3632	0.1842	0.0339	1.0388	
		.15	0.8934	0.7982	1.0145	0.4302	0.1849	2.5887	
		.25	0.8489	0.7205	1.5708	0.5158	0.2661	3.1416	
		.35	0.8282	0.7288	2.1280	0.4367	0.1907	3.6908	
		.45	0.9672	0.9356	2.7797	0.1818	0.0331	4.3070	
		.50	0.9818	0.9640	3.1416	0.0094	0.0001	3.1416	
		.55	0.9639	0.9240	3.5031	0.1813	0.0329	1.0855	
		.65	0.8802	0.7749	4.1539	0.4329	0.1874	2.5979	
		.75	0.8375	0.7014	4.7124	0.5090	0.2591	3.1416	
		.85	0.8751	0.7658	5.2717	0.4304	0.1853	3.6815	
		.95	0.9502	0.9031	5.9229	0.1793	0.0321	4.2608	
		1.00	0.9641	0.9294	6.2832	0.0184	0.0003	3.1416	
		1.05	0.9470	0.8968	6.6432	0.1788	0.0320	2.0319	
		1.15	0.8672	0.7522	7.2934	0.4268	0.1821	2.6072	
		1.25	0.8262	0.6827	7.8540	0.5024	0.2524	3.1416	
		1.35	0.8622	0.7433	8.4154	0.4244	0.1801	3.6729	
		1.45	0.9338	0.8719	9.0660	0.1772	0.0314	4.2146	
		1.50	0.9467	0.8963	9.4248	0.0271	0.0007	3.1416	

**REPORT NO. NADC-EL-52195**

$\frac{p}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n^2}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{R^2}$	$\frac{R'}{R^2}$
0.00	0.05	0.9814	0.9631	0.3672	0.1920	0.0369	1.0379
	0.15	0.8900	0.7921	1.0203	0.4560	0.2079	2.5911
	0.25	0.8448	0.7138	1.5708	0.5350	0.2862	3.1416
	0.35	0.8900	0.7921	2.1213	0.4560	0.2079	2.6921
	0.45	0.9814	0.9631	2.7744	0.1920	0.0369	4.3452
	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.9814	0.9631	3.5087	0.1920	0.0369	1.9379
	0.65	0.8900	0.7921	4.1619	0.4560	0.2079	2.5911
	0.75	0.8448	0.7138	4.7124	0.5350	0.2862	3.1416
	0.85	0.8900	0.7921	5.2629	0.4560	0.2079	3.6921
	0.95	0.9814	0.9631	5.9160	0.1920	0.0369	4.3452
	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	0.9814	0.9631	6.6503	0.1920	0.0369	1.9379
	1.15	0.8900	0.7921	7.3035	0.4560	0.2079	2.5911
	1.25	0.8448	0.7138	7.8540	0.5350	0.2862	3.1416
	1.25	0.8900	0.7921	8.4045	0.4560	0.2079	3.6921
	1.45	0.9814	0.9631	9.0576	0.1920	0.0369	4.3452
	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

$\frac{P}{.005}$	$\frac{r}{.29}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9805}$	$\frac{T_n^2}{.9614}$	$\frac{T_n}{1.0199}$	$\frac{R}{0.4550}$	$\frac{R^2}{0.2070}$	$\frac{R'}{1.9403}$
		0.05	0.9805	0.9614	0.3671	0.1919	0.0368	1.9403
		0.15	0.8880	0.7886	1.0199	0.4550	0.2070	2.5924
		0.25	0.8420	0.7090	1.5708	0.5332	0.2843	3.1416
		0.35	0.8854	0.7840	2.1221	0.4536	0.2058	3.6889
		0.45	0.9735	0.9477	2.7752	0.1906	0.0363	4.3243
		0.50	0.9808	0.9816	3.1416	0.0049	0.0000	3.1416
		0.55	0.9718	0.9444	3.5078	0.1902	0.0362	1.9635
		0.65	0.8815	0.7771	4.1693	0.4516	0.2040	2.5970
		0.75	0.8365	0.6997	4.7124	0.5297	0.2806	3.1416
		0.85	0.8789	0.7725	5.2649	0.4503	0.2028	3.6844
		0.95	0.9649	0.9310	5.9177	0.1890	0.0357	4.3010
		1.00	0.9816	0.9636	6.2832	0.0098	0.0001	3.1416
		1.05	0.9631	0.9276	6.6485	0.1887	0.0356	1.9868
		1.15	0.8750	0.7657	7.3002	0.4484	0.2011	2.6015
		1.25	0.8309	0.6904	7.8540	0.5263	0.2770	3.1416
		1.35	0.8725	0.7612	8.4076	0.4471	0.1999	3.6798
		1.45	0.9563	0.9145	9.0601	0.1876	0.0352	4.2778
		1.50	0.9726	0.9460	9.4248	0.0145	0.0002	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{K}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$									
$\frac{P}{.010}$	$\frac{r}{.25}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9756}$	$\frac{T_n^2}{.9557}$	$\frac{T_n}{0.3670}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{0.1917}$	$\frac{R^2}{0.0368}$	$\frac{R'}{1.9426}$
	0.05	0.15	0.8861	0.7851	1.0196		0.4540	0.2061	2.5938
	0.25	0.25	0.8393	0.7043	1.5708		0.5315	0.2825	3.1416
	0.35	0.35	0.8809	0.7759	2.1230		0.4513	0.2037	3.6258
	0.45	0.45	0.9657	0.9326	2.7760		0.1892	0.0358	4.3033
	0.50	0.50	0.9816	0.9636	3.1416		0.0098	0.0001	3.1416
	0.55	0.55	0.9623	0.9260	3.5068		0.1886	0.0356	1.9891
	0.65	0.65	0.8731	0.7623	4.1588		0.4474	0.2002	2.6029
	0.75	0.75	0.8281	0.6858	4.7124		0.5246	0.2752	3.1416
	0.85	0.85	0.8680	0.7533	5.2668		0.4449	0.1979	3.6767
	0.95	0.95	0.9487	0.9000	5.9193		0.1865	0.0348	4.2569
	1.00	1.00	0.9637	0.9287	6.2832		0.0192	0.0004	3.1416
	1.05	1.05	0.9453	0.8936	6.6467		0.1860	0.0346	2.0355
	1.15	1.15	0.8603	0.7401	7.2082		0.4412	0.1946	2.6120
	1.25	1.25	0.8171	0.6677	7.8540		0.5178	0.2682	3.1416
	1.35	1.35	0.8552	0.7314	8.4107		0.4387	0.1925	3.6675
	1.45	1.45	0.9320	0.8686	9.0625		0.1644	0.0340	4.2110
	1.50	1.50	0.9462	0.8952	9.4248		0.0282	0.0008	3.1416

**REPORT NO. NADC-EL-52195**

$$P = \frac{e \tan \theta}{e - \sin 2\theta}$$

$$ds = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$\frac{D}{\text{mm}}$	$r$	$\frac{d_s}{\text{mm}}$	$\frac{T_n}{\text{sec}}$	$\frac{T_n^2}{\text{sec}^2}$	$\frac{T_n}{\text{sec}}$	$\frac{R}{\text{cm}}$	$R^2$	$R'$
0.00	0.30	0.05	0.9799	0.9601	0.3712	0.1996	0.0399	1.9419
		0.15	0.8823	0.7785	1.0256	0.4706	0.2215	2.5964
		0.25	0.8349	0.6970	1.5708	0.5505	0.3030	3.1415
		0.35	0.8823	0.7785	2.1160	0.4706	0.2215	3.6868
		0.45	0.9799	0.9601	2.7704	0.1996	0.0399	4.3412
		0.50	1.0000	1.0000	3.1415	0.0000	0.0000	1.5708
		0.55	0.9799	0.9601	3.5127	0.1996	0.0399	1.9419
		0.65	0.8823	0.7785	4.1672	0.4706	0.2215	2.5964
		0.75	0.8349	0.6970	4.7124	0.5505	0.3030	3.1415
		0.85	0.8823	0.7785	5.2575	0.4706	0.2215	3.6868
		0.95	0.9799	0.9601	5.9120	0.1996	0.0399	4.3412
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9799	0.9601	6.6543	0.1996	0.0399	1.9419
		1.15	0.8823	0.7785	7.3088	0.4706	0.2215	2.5964
		1.25	0.8349	0.6970	7.8540	0.5505	0.3030	3.1415
		1.35	0.8823	0.7785	8.3992	0.4706	0.2215	3.6868
		1.45	0.9799	0.9601	9.0536	0.1996	0.0399	4.3412
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.005}$	$\frac{r}{.20}$	$\frac{ds}{.05}$	$\frac{T_n}{.9740}$	$\frac{T_n^2}{.9584}$	$\frac{T_n}{.9711}$	$\frac{R}{.1995}$	$\frac{R^2}{.0398}$	$\frac{R'}{1.9443}$
		0.05	0.8804	0.7751	1.0252	0.4596	0.2205	2.5977
		0.15	0.8321	0.6924	1.5703	0.5487	0.3010	3.1416
		0.35	0.8778	0.7705	2.1169	0.4682	0.2193	3.6837
		0.45	0.9719	0.9447	2.7713	0.1981	0.0392	4.3203
		0.50	0.9907	0.9814	3.1416	0.0051	0.0000	3.1416
		0.55	0.9702	0.9413	3.5117	0.1978	0.0391	1.9675
		0.55	0.8740	0.7633	4.1655	0.4552	0.2174	2.6022
		0.75	0.8267	0.6834	4.7124	0.5451	0.2971	3.1416
		0.85	0.8714	0.7593	5.2597	0.4649	0.2161	3.6792
		0.95	0.9632	0.9278	5.9138	0.1965	0.0386	4.2971
		1.00	0.9814	0.9632	6.2832	0.0102	0.0001	3.1416
		1.05	0.9615	0.9245	6.6524	0.1962	0.0385	1.9907
		1.15	0.8676	0.7527	7.3059	0.4629	0.2143	2.6066
		1.25	0.8212	0.6744	7.8540	0.5416	0.2933	3.1416
		1.35	0.8650	0.7483	8.4026	0.4616	0.2131	3.6748
		1.45	0.9546	0.9113	9.0563	0.1950	0.0380	4.2740
		1.50	0.9722	0.9453	9.4248	0.0151	0.0002	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52185

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.010	.30	0.05	0.9781	0.9567	0.3710	0.1993	0.0397	1.9466
		0.15	0.8785	0.7717	1.0248	0.4686	0.2196	2.5090
		0.25	0.8294	0.6879	1.5708	0.5469	0.2991	3.1416
		0.35	0.8733	0.7627	2.1178	0.4659	0.2170	3.6806
		0.45	0.9641	0.9295	2.7721	0.1966	0.0387	4.2985
		0.50	0.9914	0.9832	3.1416	0.0102	0.0001	3.1416
		0.55	0.9606	0.9228	3.5107	0.1960	0.0384	1.9930
		0.65	0.8657	0.7494	4.1636	0.4619	0.2134	2.6080
		0.75	0.8185	0.6700	4.7124	0.5398	0.2914	3.1416
		0.85	0.8606	0.7405	5.2618	0.4593	0.2110	3.6716
		0.95	0.9469	0.8967	5.9156	0.1938	0.0376	4.2532
		1.00	0.9633	0.9279	6.2832	0.0200	0.0004	3.1416
		1.05	0.9435	0.8903	6.6504	0.1933	0.0374	2.0302
		1.15	0.8530	0.7276	7.3031	0.4555	0.2074	2.6170
		1.25	0.8078	0.6525	7.8540	0.5350	0.2841	3.1416
		1.35	0.8480	0.7191	8.4058	0.4530	0.2052	3.6826
		1.45	0.9201	0.8462	9.0589	0.1916	0.0367	4.2073
		1.50	0.9456	0.8941	9.4248	0.0204	0.0009	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.25}$	$\frac{ds}{.05}$	$\frac{T_n}{.9783}$	$\frac{T_n^2}{.9570}$	$\frac{T_n'}{0.3753}$	$\frac{R}{0.2074}$	$\frac{R^2}{0.0430}$	$\frac{R'}{1.9461}$
	0.05	0.05	0.9783	0.9570	0.3753	0.2074	0.0430	1.9461
	0.15	0.15	0.8744	0.7646	1.0310	0.4852	0.2354	2.6018
	0.25	0.25	0.8247	0.6800	1.5708	0.5656	0.3200	3.1416
	0.35	0.35	0.8744	0.7646	2.1106	0.4852	0.2354	3.6814
	0.45	0.45	0.9783	0.9570	2.7663	0.2074	0.0430	4.3371
	0.50	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.55	0.9783	0.9570	3.5169	0.2074	0.0430	1.9461
	0.65	0.65	0.8744	0.7646	4.1726	0.4852	0.2354	2.6018
	0.75	0.75	0.8247	0.6800	4.7124	0.5656	0.3200	3.1416
	0.85	0.85	0.8744	0.7646	5.2522	0.4852	0.2354	3.6814
	0.95	0.95	0.9783	0.9570	5.9079	0.2074	0.0430	4.3371
	1.00	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	1.05	0.9783	0.9570	6.6585	0.2074	0.0430	1.9461
	1.15	1.15	0.8744	0.7646	7.2142	0.4852	0.2354	2.6018
	1.25	1.25	0.8247	0.6800	7.8540	0.5656	0.3200	3.1416
	1.35	1.35	0.8744	0.7646	8.3038	0.4852	0.2354	3.6814
	1.45	1.45	0.9783	0.9570	9.0494	0.2074	0.0430	4.3371
	1.50	1.50	1.0000	1.0000	9.4245	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.31}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9774}$	$\frac{T_n^2}{.9553}$	$\frac{T_n'}{.3752}$	$\frac{R}{.2072}$	$\frac{R^2}{.0429}$	$\frac{R'}{1.9484}$
		0.15	0.8725	0.7612	1.0306	0.4842	0.2344	2.6031
		0.25	0.8220	0.6757	1.5708	0.5638	0.3179	3.1416
		0.35	0.8699	0.7568	2.1115	0.4828	0.2331	3.6783
		0.45	0.9703	0.9414	2.7672	0.2057	0.0423	4.3162
		0.50	0.9905	0.9812	3.1416	0.0053	0.0000	3.1416
		0.55	0.9685	0.9380	3.5158	0.2054	0.0422	1.9716
		0.65	0.8661	0.7502	4.1709	0.4807	0.2311	2.6075
		0.75	0.8167	0.6664	4.7124	0.5602	0.3138	3.1416
		0.85	0.8636	0.7458	5.2544	0.4793	0.2297	3.6739
		0.95	0.9615	0.9245	5.9098	0.2040	0.0416	4.2931
		1.00	0.9812	0.9627	6.2832	0.0106	0.0001	3.1416
		1.05	0.9598	0.9211	6.6564	0.2037	0.0415	1.9047
		1.15	0.8598	0.7393	7.3112	0.4773	0.2278	2.6119
		1.25	0.8114	0.6583	7.8540	0.5566	0.3098	3.1416
		1.35	0.8573	0.7350	8.3972	0.4759	0.2265	3.6605
		1.45	0.9528	0.9079	9.0524	0.2025	0.0410	4.2700
		1.50	0.9720	0.9447	9.4248	0.0157	0.0002	3.1416



# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.000}$	$\frac{x}{.32}$	$\frac{ds}{.05}$	$\frac{T_n}{.9766}$	$\frac{T_n^2}{.9537}$	$\frac{T_n''}{0.3797}$	$\frac{R}{0.2152}$	$\frac{R^2}{0.0463}$	$\frac{R'}{1.9505}$
	0.15	0.8662	0.8662	0.7503	1.0366	0.4997	0.2497	2.6074
	0.25	0.8142	0.8142	0.6630	1.5708	0.5806	0.3370	3.1416
	0.35	0.8662	0.8662	0.7503	2.1050	0.4997	0.2497	3.6758
	0.45	0.9766	0.9766	0.9537	2.7619	0.2152	0.0463	4.3327
	0.50	1.0000	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.9766	0.9766	0.9537	3.5213	0.2152	0.0463	1.9505
	0.65	0.8662	0.8662	0.7503	4.1782	0.4997	0.2497	2.6074
	0.75	0.8142	0.8142	0.6630	4.7124	0.5806	0.3370	3.1416
	0.85	0.8662	0.8662	0.7503	5.2466	0.4997	0.2497	3.6758
	0.95	0.9766	0.9766	0.9537	5.9035	0.2152	0.0463	4.3327
	1.00	1.0000	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	0.9766	0.9766	0.9537	6.6629	0.2152	0.0463	1.9505
	1.15	0.8662	0.8662	0.7503	7.3198	0.4997	0.2497	2.6074
	1.25	0.8142	0.8142	0.6630	7.8540	0.5806	0.3370	3.1416
	1.35	0.8662	0.8662	0.7503	8.3882	0.4997	0.2497	3.6758
	1.45	0.9766	0.9766	0.9537	9.0451	0.2152	0.0463	4.3327
	1.50	1.0000	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

## REPORT NO. NADC-EL-52195

$\frac{P}{.005}$		$\frac{r}{.32}$	$d_s$	$\frac{ds}{.05}$	$\frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$	$\frac{T_n^2}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n^2}{T_n}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	R	R <sup>2</sup>	R'
			0.05	0.05	0.9757	0.9519	0.3796	0.2150	0.0462	0.4986	0.2486	1.9578
			0.15	0.15	0.8643	0.7471	1.0362	0.4986	0.2486	0.4986	0.2486	2.6087
			0.25	0.25	0.8116	0.6587	1.5708	0.5787	0.3349	0.5787	0.3349	3.1416
			0.35	0.35	0.8638	0.7428	2.1060	0.4972	0.2472	0.4972	0.2472	3.6728
			0.45	0.45	0.9685	0.9381	2.7629	0.2135	0.0456	0.2135	0.0456	4.3113
			0.50	0.50	0.9904	0.9809	3.1416	0.0055	0.0000	0.0055	0.0000	3.1416
			0.55	0.55	0.9668	0.9346	3.5201	0.2131	0.0454	0.2131	0.0454	1.9759
			0.65	0.65	0.8581	0.7353	4.1764	0.4950	0.2450	0.4950	0.2450	2.6130
			0.75	0.75	0.8064	0.6503	4.7124	0.5750	0.3307	0.5750	0.3307	3.1416
			0.85	0.85	0.8555	0.7321	5.2490	0.4936	0.2437	0.4936	0.2437	3.6685
			0.95	0.95	0.9597	0.9210	5.9056	0.2117	0.0448	0.2117	0.0448	4.2889
			1.00	1.00	0.9810	0.9623	6.2832	0.0110	0.0001	0.0110	0.0001	3.1416
			1.05	1.05	0.9579	0.9176	6.6606	0.2114	0.0447	0.2114	0.0447	1.9980
			1.15	1.15	0.8519	0.7257	7.3166	0.4915	0.2416	0.4915	0.2416	2.6173
			1.25	1.25	0.8013	0.6420	7.8540	0.5714	0.3265	0.5714	0.3265	3.1416
			1.35	1.35	0.8424	0.7215	8.3920	0.4901	0.2402	0.4901	0.2402	3.6642
			1.45	1.45	0.0510	0.5043	9.0482	0.2101	0.0441	0.2101	0.0441	4.2650
			1.50	1.50	0.9716	0.9440	9.4246	0.0163	0.0003	0.0163	0.0003	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.32}$	$\frac{ds}{.05}$	$\frac{T_n}{.9748}$	$\frac{T_n^2}{.9562}$	$\frac{T_n}{.3795}$	$\frac{R}{.2148}$	$\frac{R^2}{.0461}$	$\frac{R'}{1.0551}$
		0.05	0.9748	0.9562	0.3795	0.2148	0.0461	1.0551
		0.15	0.8625	0.7438	1.0357	0.4975	0.2475	2.6100
		0.25	0.8090	0.6545	1.5708	0.5769	0.3328	3.1416
		0.35	0.8575	0.7353	2.1070	0.4947	0.2447	3.6698
		0.45	0.9606	0.9227	2.7639	0.2119	0.0449	4.2912
		0.50	0.9810	0.9623	3.1416	0.0110	0.0001	3.1416
		0.55	0.9571	0.9160	3.5189	0.2112	0.0446	2.0012
		0.65	0.8500	0.7226	4.1746	0.4905	0.2406	2.6186
		0.75	0.7087	0.5379	4.7124	0.5695	0.3245	3.1416
		0.85	0.8451	0.7142	5.2513	0.4878	0.2379	3.6611
		0.95	0.9432	0.8896	5.9076	0.2088	0.0436	4.2452
		1.00	0.9624	0.9262	6.2832	0.0216	0.0005	3.1416
		1.05	0.9397	0.8831	6.6584	0.2082	0.0434	2.0471
		1.15	0.8378	0.7018	7.3134	0.4837	0.2340	2.6273
		1.25	0.7884	0.6216	7.8540	0.5626	0.3165	3.1416
		1.35	0.8329	0.6937	8.3956	0.4811	0.2315	3.6524
		1.45	0.9262	0.8578	9.0512	0.2062	0.0425	4.1997
		1.50	0.9443	0.8917	9.6948	0.0317	0.0010	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
0.00	0.33	0.05	0.9748	0.9502	0.3842	0.2231	0.0498	1.9550
		0.15	0.8578	0.7358	1.0423	0.5140	0.2642	2.6131
		0.25	0.8036	0.6458	1.5708	0.5952	0.3542	3.1416
		0.35	0.8578	0.7358	2.0993	0.5140	0.2642	3.6700
		0.45	0.9748	0.9502	2.7574	0.2231	0.0498	4.3282
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9748	0.9502	3.5258	0.2231	0.0498	1.9550
		0.65	0.8578	0.7358	4.1839	0.5140	0.2642	2.6131
		0.75	0.8036	0.6458	4.7124	0.5952	0.3542	3.1416
		0.85	0.8578	0.7358	5.2408	0.5140	0.2642	3.6700
		0.95	0.9748	0.9502	5.8989	0.2231	0.0498	4.3282
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9748	0.9502	6.6674	0.2231	0.0498	1.9550
		1.15	0.8578	0.7358	7.3255	0.5140	0.2642	2.6131
		1.25	0.8036	0.6458	7.8540	0.5952	0.3542	3.1416
		1.35	0.8578	0.7358	8.3824	0.5140	0.2642	3.6700
		1.45	0.9748	0.9502	9.0405	0.2231	0.0498	4.3282
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{R}{R^2}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
0.05	0.05	0.05	0.9485	0.3841	0.2229	0.0497	1.9572
0.15	0.15	0.15	0.7326	1.0419	0.5129	0.2631	2.8147
0.25	0.25	0.25	0.6417	1.5706	0.5433	0.3520	3.1414
0.35	0.35	0.35	0.7284	2.1003	0.5114	0.2616	3.6671
0.45	0.45	0.45	0.8345	2.7584	0.2213	0.0490	4.3073
0.50	0.50	0.50	0.8807	3.1416	0.0058	0.0000	3.1416
0.55	0.55	0.55	0.9210	3.5245	0.2209	0.0489	1.9803
0.65	0.65	0.65	0.7222	4.1820	0.5032	0.2503	2.6186
0.75	0.75	0.75	0.6336	4.7124	0.5296	0.3476	3.1416
0.85	0.85	0.85	0.7180	5.2434	0.3078	0.2579	3.6679
0.95	0.95	0.95	0.9173	5.8012	0.2195	0.0482	4.2845
1.00	1.00	1.00	0.8918	6.2532	0.0114	0.0001	3.1416
1.05	1.05	1.05	0.9140	6.6848	0.2191	0.0480	2.0033
1.15	1.15	1.15	0.7112	7.3221	0.5057	0.2557	3.6679
1.25	1.25	1.25	0.6256	7.8540	0.5259	0.3433	3.1416
1.35	1.35	1.35	0.7077	8.3564	0.5043	0.2543	3.6679
1.45	1.45	1.45	0.9006	9.0439	0.2178	0.0474	4.2845
1.50	1.50	1.50	0.9423	9.4248	0.0170	0.0003	3.1416

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin 2\theta}$$

$$\sqrt{\frac{Y}{X}} = \frac{\theta_{21} \sin \theta_1}{\theta_{22} \sin \theta_2}$$

$\frac{p}{.010}$	$\frac{r}{.33}$	$\frac{ds}{.05}$	$\frac{T_n}{.9730}$	$\frac{T_n^2}{.9467}$	$\frac{T_n^3}{.9190}$	$\frac{T_n^4}{.8938}$	$\frac{T_n^5}{.8685}$	$\frac{T_n^6}{.8432}$	$\frac{T_n^7}{.8179}$	$\frac{T_n^8}{.7926}$	$\frac{T_n^9}{.7673}$	$\frac{T_n^{10}}.7420$	$\frac{T_n^{11}}.7167$	$\frac{T_n^{12}}.6914$	$\frac{T_n^{13}}.6661$	$\frac{T_n^{14}}.6408$	$\frac{T_n^{15}}.6155$	$\frac{T_n^{16}}.5902$	$\frac{T_n^{17}}.5649$	$\frac{T_n^{18}}.5396$	$\frac{T_n^{19}}.5143$	$\frac{T_n^{20}}.4890$	$\frac{T_n^{21}}.4637$	$\frac{T_n^{22}}.4384$	$\frac{T_n^{23}}.4131$	$\frac{T_n^{24}}.3878$	$\frac{T_n^{25}}.3625$	$\frac{T_n^{26}}.3372$	$\frac{T_n^{27}}.3119$	$\frac{T_n^{28}}.2866$	$\frac{T_n^{29}}.2613$	$\frac{T_n^{30}}.2360$	$\frac{T_n^{31}}.2107$	$\frac{T_n^{32}}.1854$	$\frac{T_n^{33}}.1601$	$\frac{T_n^{34}}.1348$	$\frac{T_n^{35}}.1095$	$\frac{T_n^{36}}.0842$	$\frac{T_n^{37}}.0589$	$\frac{T_n^{38}}.0336$	$\frac{T_n^{39}}.0083$	$\frac{T_n^{40}}.0000$	$\frac{T_n^{41}}.0000$	$\frac{T_n^{42}}.0000$	$\frac{T_n^{43}}.0000$	$\frac{T_n^{44}}.0000$	$\frac{T_n^{45}}.0000$	$\frac{T_n^{46}}.0000$	$\frac{T_n^{47}}.0000$	$\frac{T_n^{48}}.0000$	$\frac{T_n^{49}}.0000$	$\frac{T_n^{50}}.0000$	$\frac{T_n^{51}}.0000$	$\frac{T_n^{52}}.0000$	$\frac{T_n^{53}}.0000$	$\frac{T_n^{54}}.0000$	$\frac{T_n^{55}}.0000$	$\frac{T_n^{56}}.0000$	$\frac{T_n^{57}}.0000$	$\frac{T_n^{58}}.0000$	$\frac{T_n^{59}}.0000$	$\frac{T_n^{60}}.0000$	$\frac{T_n^{61}}.0000$	$\frac{T_n^{62}}.0000$	$\frac{T_n^{63}}.0000$	$\frac{T_n^{64}}.0000$	$\frac{T_n^{65}}.0000$	$\frac{T_n^{66}}.0000$	$\frac{T_n^{67}}.0000$	$\frac{T_n^{68}}.0000$	$\frac{T_n^{69}}.0000$	$\frac{T_n^{70}}.0000$	$\frac{T_n^{71}}.0000$	$\frac{T_n^{72}}.0000$	$\frac{T_n^{73}}.0000$	$\frac{T_n^{74}}.0000$	$\frac{T_n^{75}}.0000$	$\frac{T_n^{76}}.0000$	$\frac{T_n^{77}}.0000$	$\frac{T_n^{78}}.0000$	$\frac{T_n^{79}}.0000$	$\frac{T_n^{80}}.0000$	$\frac{T_n^{81}}.0000$	$\frac{T_n^{82}}.0000$	$\frac{T_n^{83}}.0000$	$\frac{T_n^{84}}.0000$	$\frac{T_n^{85}}.0000$	$\frac{T_n^{86}}.0000$	$\frac{T_n^{87}}.0000$	$\frac{T_n^{88}}.0000$	$\frac{T_n^{89}}.0000$	$\frac{T_n^{90}}.0000$	$\frac{T_n^{91}}.0000$	$\frac{T_n^{92}}.0000$	$\frac{T_n^{93}}.0000$	$\frac{T_n^{94}}.0000$	$\frac{T_n^{95}}.0000$	$\frac{T_n^{96}}.0000$	$\frac{T_n^{97}}.0000$	$\frac{T_n^{98}}.0000$	$\frac{T_n^{99}}.0000$	$\frac{T_n^{100}}.0000$	$\frac{T_n^{101}}.0000$	$\frac{T_n^{102}}.0000$	$\frac{T_n^{103}}.0000$	$\frac{T_n^{104}}.0000$	$\frac{T_n^{105}}.0000$	$\frac{T_n^{106}}.0000$	$\frac{T_n^{107}}.0000$	$\frac{T_n^{108}}.0000$	$\frac{T_n^{109}}.0000$	$\frac{T_n^{110}}.0000$	$\frac{T_n^{111}}.0000$	$\frac{T_n^{112}}.0000$	$\frac{T_n^{113}}.0000$	$\frac{T_n^{114}}.0000$	$\frac{T_n^{115}}.0000$	$\frac{T_n^{116}}.0000$	$\frac{T_n^{117}}.0000$	$\frac{T_n^{118}}.0000$	$\frac{T_n^{119}}.0000$	$\frac{T_n^{120}}.0000$	$\frac{T_n^{121}}.0000$	$\frac{T_n^{122}}.0000$	$\frac{T_n^{123}}.0000$	$\frac{T_n^{124}}.0000$	$\frac{T_n^{125}}.0000$	$\frac{T_n^{126}}.0000$	$\frac{T_n^{127}}.0000$	$\frac{T_n^{128}}.0000$	$\frac{T_n^{129}}.0000$	$\frac{T_n^{130}}.0000$	$\frac{T_n^{131}}.0000$	$\frac{T_n^{132}}.0000$	$\frac{T_n^{133}}.0000$	$\frac{T_n^{134}}.0000$	$\frac{T_n^{135}}.0000$	$\frac{T_n^{136}}.0000$	$\frac{T_n^{137}}.0000$	$\frac{T_n^{138}}.0000$	$\frac{T_n^{139}}.0000$	$\frac{T_n^{140}}.0000$	$\frac{T_n^{141}}.0000$	$\frac{T_n^{142}}.0000$	$\frac{T_n^{143}}.0000$	$\frac{T_n^{144}}.0000$	$\frac{T_n^{145}}.0000$	$\frac{T_n^{146}}.0000$	$\frac{T_n^{147}}.0000$	$\frac{T_n^{148}}.0000$	$\frac{T_n^{149}}.0000$	$\frac{T_n^{150}}.0000$	$\frac{T_n^{151}}.0000$	$\frac{T_n^{152}}.0000$	$\frac{T_n^{153}}.0000$	$\frac{T_n^{154}}.0000$	$\frac{T_n^{155}}.0000$	$\frac{T_n^{156}}.0000$	$\frac{T_n^{157}}.0000$	$\frac{T_n^{158}}.0000$	$\frac{T_n^{159}}.0000$	$\frac{T_n^{160}}.0000$	$\frac{T_n^{161}}.0000$	$\frac{T_n^{162}}.0000$	$\frac{T_n^{163}}.0000$	$\frac{T_n^{164}}.0000$	$\frac{T_n^{165}}.0000$	$\frac{T_n^{166}}.0000$	$\frac{T_n^{167}}.0000$	$\frac{T_n^{168}}.0000$	$\frac{T_n^{169}}.0000$	$\frac{T_n^{170}}.0000$	$\frac{T_n^{171}}.0000$	$\frac{T_n^{172}}.0000$	$\frac{T_n^{173}}.0000$	$\frac{T_n^{174}}.0000$	$\frac{T_n^{175}}.0000$	$\frac{T_n^{176}}.0000$	$\frac{T_n^{177}}.0000$	$\frac{T_n^{178}}.0000$	$\frac{T_n^{179}}.0000$	$\frac{T_n^{180}}.0000$	$\frac{T_n^{181}}.0000$	$\frac{T_n^{182}}.0000$	$\frac{T_n^{183}}.0000$	$\frac{T_n^{184}}.0000$	$\frac{T_n^{185}}.0000$	$\frac{T_n^{186}}.0000$	$\frac{T_n^{187}}.0000$	$\frac{T_n^{188}}.0000$	$\frac{T_n^{1$
------------------	-----------------	------------------	---------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	-----------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	-------------------------	----------------

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{r}$	$\frac{ds}{r}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
0.05	0.05	0.9729	0.9466	0.3890	0.2312	0.0534	1.9598
0.15	0.15	0.8491	0.7210	1.0457	0.5282	0.2790	2.6190
0.25	0.25	0.7928	0.6285	1.5708	0.6095	0.3715	3.1416
0.35	0.35	0.8491	0.7210	2.0934	0.5282	0.2790	3.6642
0.45	0.45	0.9729	0.9466	2.7526	0.2312	0.0534	4.3234
0.50	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55	0.55	0.9729	0.9466	3.5306	0.2312	0.0534	1.9598
0.65	0.65	0.8491	0.7210	4.1898	0.5282	0.2790	2.6190
0.75	0.75	0.7928	0.6285	4.7124	0.6095	0.3715	3.1416
0.85	0.85	0.8491	0.7210	5.2350	0.5282	0.2790	3.6642
0.95	0.95	0.9729	0.9466	5.8942	0.2312	0.0534	4.3234
1.00	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05	1.05	0.9729	0.9466	6.6722	0.2312	0.0534	1.9598
1.15	1.15	0.8491	0.7210	7.3314	0.5282	0.2790	2.6190
1.25	1.25	0.7928	0.6285	7.8540	0.6095	0.3715	3.1416
1.35	1.35	0.8491	0.7210	8.3765	0.5282	0.2790	3.6642
1.45	1.45	0.9729	0.9466	9.0258	0.2312	0.0534	4.3234
1.50	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

P	r	d <sub>s</sub>	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
.005	.34	0.05	0.9720	0.9448	0.3888	0.2309	0.0533	1.9621
		0.15	0.8473	0.7179	1.0478	0.5271	0.2778	2.6203
		0.25	0.7903	0.6246	1.5708	0.6076	0.3692	3.1416
		0.35	0.8449	0.7138	2.0945	0.5256	0.2762	3.6613
		0.45	0.9647	0.9307	2.7538	0.2293	0.0526	4.3028
		0.50	0.9902	0.9804	3.1416	0.0060	0.0000	3.1416
		0.55	0.9629	0.9273	3.5292	0.2289	0.0524	1.9849
		0.65	0.8413	0.7077	4.1878	0.5233	0.2739	2.6244
		0.75	0.7854	0.6168	4.7124	0.6039	0.3647	3.1416
		0.85	0.8339	0.7037	5.2376	0.5219	0.2724	3.6571
		0.95	0.9558	0.9135	5.8966	0.2274	0.0517	4.2799
		1.00	0.9805	0.9613	6.2832	0.0118	0.0001	3.1416
		1.05	0.9540	0.9101	6.5695	0.2270	0.0515	2.0078
		1.15	0.8353	0.6977	7.3278	0.5197	0.2701	2.6285
		1.25	0.7805	0.6091	7.8540	0.6002	0.3602	3.1416
		1.35	0.8329	0.6937	8.3808	0.5183	0.2686	3.6530
		1.45	0.9465	0.8966	9.0394	0.2256	0.0509	4.2571
		1.50	0.9709	0.9426	9.4248	0.0176	0.0003	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

		$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{p}{r}$	$\frac{r}{ds}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
.010	.34	0.9711	0.9430	0.3887	0.2307	0.0532	1.9644
		0.8455	0.7149	1.0473	0.5259	0.2766	2.6215
		0.7878	0.6207	1.5708	0.6058	0.3670	3.1416
		0.8407	0.7067	2.0956	0.5230	0.2735	3.6584
		0.9567	0.9152	2.7549	0.2275	0.0518	4.2822
		0.9805	0.9613	3.1416	0.0118	0.0001	3.1416
		0.9531	0.9084	3.5278	0.2268	0.0514	3.0102
		0.8335	0.6947	4.1858	0.5186	0.2690	3.6208
		0.7730	0.6052	4.7124	0.5984	0.3580	3.1416
		0.8287	0.6867	5.2402	0.5158	0.2660	3.6500
		0.9390	0.8818	5.8989	0.2241	0.0502	4.2366
		0.9614	0.9243	6.2832	0.0232	0.0005	3.1416
		0.9355	0.8752	6.6669	0.2235	0.0500	3.0557
		0.8216	0.6750	7.3243	0.5116	0.2617	2.6382
		0.7682	0.5902	7.8540	0.5911	0.3495	3.1416
		0.8168	0.6672	8.3848	0.5088	0.2589	3.6416
		0.9218	0.8497	9.0429	0.2214	0.0490	4.1913
		0.9429	0.8890	9.4248	0.0342	0.0012	3.1416

## 1

$$ds = \frac{\lambda}{x} \sqrt{1 - \sin^2 \theta}$$

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

		$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$			
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$
0.05	0.35	0.05	0.9700	0.9409	0.3938	0.2391	0.0572
		0.15	0.8384	0.7030	1.0538	0.5411	0.2928
		0.25	0.7793	0.6074	1.5708	0.6217	0.3865
		0.35	0.8361	0.6990	2.0885	0.5396	0.2911
		0.45	0.9627	0.9268	2.7489	0.2374	0.0563
		0.50	0.9900	0.9801	3.1416	0.0064	0.0000
		0.55	0.9600	0.9233	3.5340	0.2375	0.0562
		0.65	0.8325	0.6930	4.1037	0.5373	0.2887
		0.75	0.7745	0.5999	4.7124	0.6179	0.3818
		0.85	0.8301	0.6891	5.2317	0.5358	0.2871
		0.95	0.9537	0.9095	5.8919	0.2354	0.0554
		1.00	0.9802	0.9608	6.2832	0.0123	0.0002
		1.05	0.9519	0.9061	6.6742	0.2350	0.0552
		1.15	0.8266	0.6833	7.3337	0.5336	0.2847
		1.25	0.7608	0.5805	7.8540	0.6142	0.3772
		1.35	0.8242	0.6794	8.3750	0.5321	0.2832
		1.45	0.9447	0.8925	9.0348	0.2335	0.0545
		1.50	0.9795	0.9418	9.4248	0.0182	0.0003

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d\mathbf{s} = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.35}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9691}$	$\frac{T_n^2}{0.9392}$	$\frac{T_n}{0.3936}$	$\frac{R}{0.2389}$	$\frac{R^2}{0.0571}$	$\frac{R'}{1.9693}$
		0.05	0.9691	0.9392	0.3936	0.2389	0.0571	1.9693
		0.15	0.8366	0.7000	1.0533	0.5400	0.2916	2.6275
		0.25	0.7769	0.6036	1.5708	0.6198	0.3842	3.1416
		0.35	0.8219	0.6921	2.0897	0.5369	0.2883	3.6525
		0.45	0.9546	0.9112	2.7501	0.2356	0.0555	4.2774
		0.50	0.9802	0.9608	3.1416	0.0123	0.0002	3.1416
		0.55	0.9510	0.9043	3.5325	0.2348	0.0551	2.0148
		0.65	0.8248	0.6803	4.1916	0.5325	0.2835	2.6356
		0.75	0.7674	0.5889	4.7124	0.6123	0.3749	3.1416
		0.85	0.8201	0.6726	5.2345	0.5296	0.2805	3.6443
		0.95	0.9368	0.8776	5.8943	0.2320	0.0538	4.2320
		1.00	0.9609	0.9232	6.2832	0.0241	0.0006	3.1416
		1.05	0.9333	0.8710	6.6715	0.2314	0.0535	2.0603
		1.15	0.8131	0.6612	7.3300	0.5253	0.2759	2.6438
		1.25	0.7579	0.5744	7.8540	0.6050	0.3661	3.1416
		1.35	0.8085	0.6536	8.3792	0.5225	0.2730	3.6361
		1.45	0.9194	0.8453	9.0385	0.2291	0.0525	4.1869
		1.50	0.9421	0.8876	9.4748	0.0354	0.0013	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{\epsilon}$	$\frac{r}{\epsilon}$	$\frac{d_s}{\epsilon}$	$\frac{T_n}{\epsilon}$	$\frac{T_n^2}{\epsilon}$	$\frac{T_n}{\epsilon}$	$\frac{R}{\epsilon}$	$\frac{R^2}{\epsilon}$	$\frac{R'}{\epsilon}$
.300	.36	0.05	0.9688	0.9387	0.9891	0.2477	0.0613	1.0600
		0.15	0.8311	0.6907	1.0604	0.5562	0.3093	2.6312
		0.25	0.7705	0.5937	1.5708	0.6374	0.4063	3.1416
		0.35	0.8311	0.6907	2.0812	0.5562	0.3093	3.6520
		0.45	0.9688	0.9387	2.7425	0.2477	0.0613	4.3133
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9688	0.9387	3.5406	0.2477	0.0613	1.0600
		0.65	0.8311	0.6907	4.2020	0.5562	0.3093	2.6312
		0.75	0.7705	0.5937	4.7124	0.6374	0.4063	3.1416
		0.85	0.8311	0.6907	5.2227	0.5562	0.3093	3.6520
		0.95	0.9688	0.9387	5.8841	0.2477	0.0613	4.3133
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9688	0.9387	6.6822	0.2477	0.0613	1.0600
		1.15	0.8311	0.6907	7.3436	0.5562	0.3093	2.6312
		1.25	0.7705	0.5937	7.8540	0.6374	0.4063	3.1416
		1.35	0.8311	0.6907	8.3643	0.5562	0.3093	3.6520
		1.45	0.9688	0.9387	9.0257	0.2477	0.0613	4.3133
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$									
P	r	$\frac{d_s}{\lambda}$	$\frac{T_n}{0.9679}$	$\frac{T_n^2}{0.9369}$	$\frac{T_n'}{0.3989}$	$\frac{R}{0.2474}$	$\frac{R^2}{0.0612}$	$\frac{R'}{1.9721}$	
0.05	0.35	0.15	0.8293	0.5873	1.0599	0.5550	0.3080	2.6324	
		0.25	0.7682	0.5901	1.5708	0.6355	0.4038	3.1416	
		0.45	0.9606	0.9227	2.7439	0.2455	0.0603	4.2929	
		0.55	0.8270	0.6833	2.0824	0.5534	0.3063	3.6492	
		0.50	0.9899	0.9799	3.1416	0.0064	0.0000	3.1416	
		0.55	0.9587	0.9191	3.5390	0.2452	0.0601	1.9948	
		0.65	0.8235	0.6781	4.1998	0.5511	0.3038	2.6364	
		0.75	0.7636	0.5830	4.7124	0.6317	0.3990	3.1416	
		0.85	0.8212	0.6743	5.2257	0.5496	0.3021	3.6452	
		0.95	0.9514	0.9052	5.8869	0.2435	0.0593	4.2702	
		1.00	0.9799	0.9602	6.2832	0.0127	0.0002	3.1416	
		1.05	0.9496	0.9018	6.6792	0.2431	0.0591	2.0175	
		1.15	0.8177	0.6686	7.3396	0.5474	0.2996	2.6404	
		1.25	0.7589	0.5759	7.8540	0.6279	0.3943	3.1416	
		1.35	0.8154	0.6648	8.3690	0.5459	0.2980	3.6412	
		1.45	0.9424	0.8882	9.0299	0.2416	0.0584	4.2475	
		1.50	0.9701	0.9410	9.4248	0.0189	0.0004	3.1416	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_g = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	d <sub>g</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.010	.36	0.05	0.9670	0.9351	0.9988	0.2472	0.0611	1.9744
		0.15	0.8276	0.6849	1.0594	0.5538	0.3067	2.6336
		0.25	0.7659	0.5866	1.5708	0.6336	0.4014	3.1416
		0.35	0.8229	0.6772	2.0836	0.5508	0.3033	3.6464
		0.45	0.9523	0.9070	2.7452	0.2427	0.0594	4.2725
		0.50	0.9799	0.9602	3.1416	0.0127	0.0002	3.1416
		0.55	0.9487	0.9001	3.5375	0.2429	0.0590	2.0198
		0.65	0.8160	0.6658	4.1975	0.5462	0.2984	2.6416
		0.75	0.7566	0.5724	4.7124	0.6260	0.3919	3.1416
		0.85	0.8112	0.6583	5.2286	0.5433	0.2951	3.5384
		0.95	0.9344	0.8732	5.8895	0.2400	0.0576	4.2272
		1.00	0.9604	0.9223	6.2832	0.0250	0.0006	3.1416
		1.05	0.9309	0.8666	6.6763	0.2593	0.0573	2.0650
		1.15	0.8045	0.6472	7.3358	0.5389	0.2904	2.6406
		1.25	0.7473	0.5585	7.8540	0.6137	0.3828	3.1416
		1.35	0.7009	0.6398	8.3735	0.5360	0.2873	3.6303
		1.45	0.9170	0.8408	9.0339	0.2369	0.0561	4.1823
		1.50	0.9414	0.8862	9.4245	0.0367	0.0013	3.1416

**REPORT NO. NADC-EL-52195**

112

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{e - \sin^2 \theta}}{\lambda}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	0.37	0.05	0.9657	0.9326	0.4047	0.2559	0.0655	1.9775
		0.15	0.8200	0.6723	1.0662	0.5688	0.3235	2.6387
		0.25	0.7564	0.5729	1.5709	0.6490	0.4211	3.1416
		0.35	0.8177	0.6686	2.0761	0.5672	0.3217	3.6420
		0.45	0.9583	0.9183	2.7386	0.2540	0.0645	4.2876
		0.50	0.9897	0.9796	3.1416	0.0067	0.0000	3.1416
		0.55	0.9564	0.9148	3.5443	0.2535	0.0643	2.0001
		0.65	0.8147	0.6630	4.2060	0.5648	0.3190	2.6426
		0.75	0.7524	0.5641	4.7124	0.6451	0.4162	2.1416
		0.85	0.8120	0.6593	5.2196	0.5633	0.3173	3.6391
		0.95	0.9491	0.9008	5.8817	0.2518	0.0534	4.2651
		1.00	0.9796	0.9596	6.2832	0.0132	0.0002	3.1416
		1.05	0.9473	0.8973	6.6843	0.2513	0.0632	2.0226
		1.15	0.8088	0.6538	7.3457	0.5610	0.3147	2.6465
		1.25	0.7479	0.5593	7.8540	0.6413	0.4113	3.1416
		1.35	0.8063	0.6501	8.3629	0.5595	0.3130	3.6351
		1.45	0.9400	0.8847	9.0248	0.2497	0.0625	4.2425
		1.50	0.9606	0.9402	9.6246	0.0196	0.0004	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_b}{\lambda}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.010	.37	0.05	0.9648	0.9308	0.4041	0.2556	0.2556	0.0653	1.9797
		0.15	0.8182	0.6695	1.0656	0.5676	0.5676	0.3221	2.6399
		0.25	0.7546	0.5695	1.5708	0.6470	0.6470	0.4187	3.1416
		0.35	0.8137	0.6621	2.0774	0.5644	0.5644	0.3186	3.6402
		0.45	0.9500	0.9025	2.7400	0.2520	0.2520	0.0635	4.2673
		0.50	0.9796	0.9596	3.1416	0.0132	0.0132	0.0002	3.1416
		0.55	0.9464	0.8956	3.5426	0.2511	0.2511	0.0631	2.0249
		0.65	0.8069	0.6510	4.2036	0.5598	0.5598	0.3134	2.6475
		0.75	0.7456	0.5560	4.7124	0.6395	0.6395	0.4089	3.1416
		0.85	0.8023	0.6437	5.2226	0.5568	0.5568	0.3100	3.6324
		0.95	0.9320	0.8686	5.8846	0.2481	0.2481	0.0615	4.2222
		1.00	0.9598	0.9212	6.2832	0.0259	0.0259	0.0007	3.1416
		1.05	0.9284	0.8620	6.6812	0.2474	0.2474	0.0612	2.0699
		1.15	0.7956	0.6329	7.3417	0.5524	0.5524	0.3051	2.6555
		1.25	0.7366	0.5426	7.8540	0.6321	0.6321	0.3995	3.1416
		1.35	0.7911	0.6258	8.3677	0.5495	0.5495	0.3019	3.6245
		1.45	0.9144	0.8361	9.0291	0.2449	0.2449	0.0600	4.1775
		1.50	0.9406	0.8846	9.4248	0.0380	0.0380	0.0014	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.38}$	$\frac{ds}{.05}$	$\frac{T_n}{.9643}$	$\frac{T_n^2}{0.9299}$	$\frac{T_n}{1.0732}$	$\frac{R}{0.2647}$	$\frac{R^2}{0.0701}$	$\frac{R'}{1.9808}$
		0.15	0.8121	0.6594	1.0732	0.5836	0.3406	2.6440
		0.25	0.7476	0.5590	1.5708	0.6641	0.4410	3.1416
		0.35	0.8121	0.6594	2.0684	0.5836	0.3406	3.6392
		0.45	0.9643	0.9299	2.7316	0.2647	0.0701	4.3024
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9643	0.9299	3.5516	0.2647	0.0701	1.9808
		0.65	0.8121	0.6594	4.2148	0.5836	0.3406	2.6440
		0.75	0.7476	0.5590	4.7124	0.6641	0.4410	3.1416
		0.85	0.8121	0.6594	5.2100	0.5836	0.3406	3.6392
		0.95	0.9643	0.9299	5.8732	0.2647	0.0701	4.3024
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9643	0.9299	6.6932	0.2647	0.0701	1.9808
		1.15	0.8121	0.6594	7.3564	0.5836	0.3406	2.6440
		1.25	0.7476	0.5590	7.8540	0.6641	0.4410	3.1416
		1.35	0.8121	0.6594	8.3516	0.5836	0.3406	3.6392
		1.45	0.9643	0.9299	9.0148	0.2647	0.0701	4.3024
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \beta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.38}$	$\frac{ds}{.05}$	$\frac{T_n}{.9634}$	$\frac{T_n^2}{0.9281}$	$\frac{T_n'}{0.4093}$	$\frac{R}{0.2644}$	$\frac{R^2}{0.0699}$	$\frac{R'}{1.9830}$
		0.15	0.8104	0.6567	1.0726	0.5824	0.3391	2.6451
		0.25	0.7454	0.5557	1.5708	0.6522	0.4385	3.1416
		0.35	0.8081	0.6531	2.0698	0.5808	0.3373	3.6366
		0.45	0.9559	0.9137	2.7331	0.2625	0.0689	4.2822
		0.50	0.9835	0.9793	3.1416	0.0069	0.0000	3.1416
		0.55	0.9540	0.9102	3.5497	0.2620	0.0686	2.0055
		0.65	0.8048	0.6477	4.2123	0.5784	0.3345	2.6489
		0.75	0.7411	0.5492	4.7124	0.6533	0.4334	3.1416
		0.85	0.8025	0.6441	5.2133	0.5768	0.3327	3.6328
		0.95	0.9466	0.8961	5.8764	0.2601	0.0677	4.2597
		1.00	0.9793	0.9590	6.2832	0.0137	0.0002	3.1416
		1.05	0.9448	0.8927	6.6897	0.2597	0.0674	2.0280
		1.15	0.7992	0.6387	7.3520	0.5745	0.3300	2.6527
		1.25	0.7367	0.5427	7.8540	0.6545	0.4284	3.1416
		1.35	0.7970	0.6352	8.3567	0.5729	0.3282	3.6289
		1.45	0.9375	0.8789	9.0196	0.2580	0.0666	4.2372
		1.50	0.9692	0.9393	9.4248	0.0203	0.0004	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.010}$	$\frac{r}{.38}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9624}$	$\frac{T_n^2}{0.9263}$	$\frac{T_n}{0.4096}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{0.2642}$	$\frac{R^2}{0.0698}$	$\frac{R'}{1.9853}$
0.15	0.8087	0.6540	1.0720	1.1498	1.0720	0.5812	0.3377	0.1137	2.6463
0.25	0.7433	0.5524	1.5708	2.4671	1.5708	0.6602	0.4359	0.1891	3.1416
0.35	0.8042	0.6468	2.0711	4.2895	2.0711	0.5780	0.3341	0.1124	3.6339
0.45	0.9476	0.8979	2.7346	7.5071	2.7346	0.2604	0.0678	0.0231	4.2619
0.50	0.9793	0.9590	3.1416	9.8696	3.1416	0.0137	0.0002	0.0000	3.1416
0.55	0.9439	0.8909	3.5479	12.5411	3.5479	0.2595	0.0673	0.0452	2.0302
0.65	0.7975	0.6360	4.2092	17.7211	4.2092	0.5733	0.3287	0.1080	2.6539
0.75	0.7345	0.5395	4.7124	22.2041	4.7124	0.6526	0.4259	0.1811	3.1416
0.85	0.7931	0.6290	5.2164	27.2164	5.2164	0.5702	0.3252	0.1065	3.6263
0.95	0.9294	0.8638	5.8794	34.5638	5.8794	0.2563	0.0657	0.0424	4.2171
1.00	0.9592	0.9201	6.2832	39.4752	6.2832	0.0268	0.0007	0.0000	3.1416
1.05	0.9258	0.8571	6.6863	44.5041	6.6863	0.2556	0.0653	0.0424	2.0751
1.15	0.7865	0.6185	7.3477	53.9911	7.3477	0.5657	0.3200	0.1036	2.6616
1.25	0.7258	0.5267	7.8540	61.6811	7.8540	0.6452	0.4162	0.1731	3.1416
1.35	0.7821	0.6116	8.3617	69.9161	8.3617	0.5628	0.3167	0.1000	3.6185
1.45	0.9117	0.8311	9.0241	81.4361	9.0241	0.2529	0.0640	0.0416	4.1725
1.50	0.9397	0.8830	9.4248	88.8361	9.4248	0.0393	0.0015	0.0000	3.1416

## REPORT NO. NADC-EL-52195

$\frac{P}{r}$	$\frac{r}{d_s}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n^2}$	$\frac{R}{R^2}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
0.000	0.19	0.9619	0.9252	0.4158	0.2734	0.0748	1.9866
	0.15	0.8022	0.6436	1.0798	0.5970	0.3564	2.6506
	0.25	0.7360	0.5416	1.5708	0.6770	0.4584	3.1416
	0.35	0.8022	0.6436	2.0618	0.5970	0.3564	3.6326
	0.45	0.9619	0.9252	2.7258	0.2734	0.0748	4.2966
	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.9619	0.9252	3.5573	0.2734	0.0748	1.9866
	0.65	0.8022	0.6436	4.2214	0.5970	0.3564	2.6506
	0.75	0.7360	0.5416	4.7124	0.6770	0.4584	3.1416
	0.85	0.8022	0.6436	5.2034	0.5970	0.3564	3.6326
	0.95	0.9619	0.9252	5.6674	0.2734	0.0748	4.2966
	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	0.9619	0.9252	6.6389	0.2734	0.0748	1.9866
	1.15	0.8022	0.6436	7.3630	0.5970	0.3564	2.6506
	1.25	0.7360	0.5416	7.8540	0.6770	0.4584	3.1416
	1.35	0.8022	0.6436	8.3450	0.5970	0.3564	3.6326
	1.45	0.9619	0.9252	9.0090	0.2734	0.0748	4.2966
	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{r}$	$\frac{r}{r_0}$	$\frac{ds}{dn}$	$\frac{T_n}{T_0}$	$\frac{T_n^2}{T_0^2}$	$\frac{T_n^3}{T_0^3}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
0.05	0.15	0.005	0.9609	0.9234	0.8756	0.2732	0.0746	1.9888
0.15	0.25	0.006	0.8006	0.6409	1.0792	0.5958	0.3550	2.6517
0.25	0.35	0.7338	0.5385	1.5708	2.0632	0.6751	0.4557	3.1416
0.35	0.45	0.7984	0.6374	2.0632	2.7274	0.5942	0.3531	3.6300
0.45	0.50	0.9534	0.9090	2.7274	3.1416	0.2711	0.0735	4.2755
0.50	0.55	0.9894	0.9789	3.1416	3.5554	0.0071	0.0001	3.1416
0.55	0.65	0.9515	0.9054	3.5554	4.2187	0.2706	0.0732	2.0112
0.65	0.75	0.7951	0.6321	4.2187	4.7124	0.5918	0.3502	2.6554
0.75	0.85	0.7296	0.5323	4.7124	5.2068	0.6712	0.4505	3.1416
0.85	0.95	0.7929	0.6287	5.2068	5.8708	0.5902	0.3483	3.6263
0.95	1.00	0.9441	0.8913	5.8708	6.2832	0.2687	0.0722	4.2541
1.00	1.05	0.9790	0.9584	6.2832	6.6952	0.0141	0.0002	3.1416
1.05	1.15	0.9422	0.8878	6.6952	7.3584	0.2682	0.0719	2.0335
1.15	1.25	0.7896	0.6235	7.3584	7.8540	0.5878	0.3455	2.6591
1.25	1.35	0.7253	0.5261	7.8540	8.3504	0.6674	0.4454	3.1416
1.35	1.45	0.7874	0.6200	8.3504	9.0141	0.5862	0.3437	3.6226
1.45	1.50	0.9349	0.8740	9.0141	9.4248	0.2665	0.0710	4.2318
1.50	1.55	0.9687	0.9384	9.4248	0.0004	0.0210	0.0004	3.1416

## REPORT NO. NADC-EL-52195

$\frac{P}{\text{°}}$	$\frac{r}{\text{°}}$	$\frac{d_s}{\text{°}}$	$d_s = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$		$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$		$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
			$T_n$	$T_n^2$	$T_n$	$T_n$					
0.10.	0.39	0.05	0.9600	0.9216	0.4154	0.2729	0.0745	1.9910			
		0.15	0.7989	0.6383	1.0786	0.5946	0.3535	2.6528			
		0.25	0.7317	0.5354	1.5708	0.6731	0.4531	3.1416			
		0.35	0.7945	0.6313	2.0646	0.5914	0.3497	3.6275			
		0.45	0.9450	0.8930	2.7290	0.2689	0.0723	4.2564			
		0.50	0.9790	0.9584	3.1416	0.0141	0.0002	3.1416			
		0.55	0.9413	0.8860	3.5535	0.2680	0.0718	2.0358			
		0.65	0.7880	0.6209	4.2162	0.5866	0.3441	2.6602			
		0.75	0.7232	0.5230	4.7124	0.6655	0.4429	3.1416			
		0.85	0.7836	0.6141	5.2102	0.5835	0.3405	3.6200			
		0.95	0.9267	0.8587	5.8740	0.2647	0.0700	4.2117			
		1.00	0.9586	0.9189	6.2632	0.0277	0.0008	3.1416			
		1.05	0.9231	0.8521	6.6917	0.2639	0.0696	2.0804			
		1.15	0.7771	0.6039	7.3539	0.5789	0.3352	2.6677			
		1.25	0.7147	0.5109	7.8540	0.6580	0.4330	3.1416			
		1.35	0.7728	0.5972	8.3556	0.5759	0.3317	3.6124			
		1.45	0.9088	0.8260	9.0189	0.2611	0.0682	4.1573			
		1.50	0.9388	0.8814	9.4248	0.0407	0.0017	3.1416			

REPORT NO. NADC-EL-52195

121

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.40}$	$\frac{ds}{.05}$	$\frac{T_n}{.9584}$	$\frac{T_n^2}{0.9185}$	$\frac{T_n'}{0.4216}$	$\frac{R}{0.2820}$	$\frac{R^2}{0.0796}$	$\frac{R'}{1.9948}$
		0.15	0.7905	0.6249	1.0858	0.6091	0.3710	2.6583
		0.25	0.7221	0.5214	1.5708	0.6877	0.4729	3.1416
		0.35	0.7884	0.6215	2.0566	0.6074	0.3690	3.6234
		0.45	0.9508	0.9039	2.7215	0.2799	0.0783	4.2706
		0.50	0.9892	0.9786	3.1416	0.0074	0.0001	3.1416
		0.55	0.9489	0.9003	3.5613	0.2794	0.0780	2.0171
		0.65	0.7852	0.6165	4.2253	0.6050	0.3660	2.6619
		0.75	0.7180	0.5155	4.7124	0.6828	0.4676	3.1416
		0.85	0.7820	0.6131	5.2003	0.6034	0.3641	3.6198
		0.95	0.9414	0.8861	5.8650	0.2774	0.0769	4.2483
		1.00	0.9786	0.9578	6.2832	0.0146	0.0002	3.1416
		1.05	0.9395	0.8826	6.7010	0.2769	0.0767	2.0393
		1.15	0.7798	0.6051	7.3648	0.6010	0.3612	2.6656
		1.25	0.7138	0.5095	7.8540	0.6800	0.4624	3.1416
		1.35	0.7777	0.6048	8.3439	0.5994	0.3593	3.6161
		1.45	0.9321	0.8668	9.0084	0.2751	0.0757	4.2261
		1.50	0.9682	0.9375	9.4248	0.0217	0.0005	3.1416

## REPORT NO. NADC-EL-52195

$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$									
$\frac{P}{.010}$	$\frac{r}{.40}$	$\frac{ds}{.05}$	$\frac{T_n}{.9574}$	$\frac{T_n^2}{.9166}$	$\frac{T_n}{1.0852}$	$\frac{R}{0.2818}$	$\frac{R^2}{0.0794}$	$\frac{R'}{1.9970}$	
		0.15	0.7889	0.6224	1.5708	0.6079	0.3695	2.6594	
		0.25	0.7200	0.5184	2.0581	0.6858	0.4703	3.1416	
		0.35	0.7845	0.6156	2.7232	0.6046	0.3655	3.6209	
		0.45	0.9423	0.8879	3.1416	0.2776	0.0771	4.2505	
		0.50	0.9786	0.9578	3.5592	0.0146	0.0002	3.1416	
		0.55	0.9386	0.8809	4.2226	0.2767	0.0765	2.0415	
		0.65	0.7782	0.6056	4.7124	0.5498	0.3597	2.6567	
		0.75	0.7118	0.5067	5.2038	0.6781	0.4598	3.1416	
		0.85	0.7739	0.5990	5.8685	0.5966	0.3560	3.6136	
		0.95	0.9238	0.8535	6.2822	0.2732	0.0746	4.2061	
		1.00	0.9580	0.9177	6.6972	0.0287	0.0008	3.1416	
		1.05	0.9202	0.8468	7.3602	0.2724	0.0742	2.0859	
		1.15	0.7676	0.5892	7.8540	0.5920	0.3505	2.6740	
		1.25	0.7026	0.4950	8.3494	0.6706	0.4497	3.1416	
		1.35	0.7633	0.5827	9.0136	0.5890	0.3469	3.6062	
		1.45	0.9059	0.8206	9.4248	0.2695	0.0726	4.1620	
		1.50	0.9379	0.8797		0.0421	0.0018	3.1416	

$$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

$\frac{P}{.000}$	$\frac{r}{.41}$	$\frac{ds}{.05}$	$\frac{T_n}{.9566}$	$\frac{T_n^2}{.9151}$	$\frac{T_n}{.4280}$	$\frac{R}{.2914}$	$\frac{R^2}{.0849}$	$\frac{R'}{1.9988}$
		0.05	0.9566	0.9151	0.4280	0.2914	0.0849	1.9988
		0.15	0.7818	0.6113	1.0933	0.6235	0.3887	2.6641
		0.25	0.7122	0.5072	1.5708	0.7020	0.4928	3.1416
		0.35	0.7818	0.6113	2.0483	0.6235	0.3887	3.6191
		0.45	0.9566	0.9151	2.7126	0.2914	0.0849	4.2844
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9566	0.9151	3.5695	0.2914	0.0849	1.9988
		0.65	0.7818	0.6113	4.2349	0.6235	0.3887	2.6641
		0.75	0.7122	0.5072	4.7124	0.7020	0.4928	3.1416
		0.85	0.7818	0.6113	5.1899	0.6235	0.3887	3.6191
		0.95	0.9566	0.9151	5.8552	0.2914	0.0849	4.2844
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9566	0.9151	6.7112	0.2914	0.0849	1.9988
		1.15	0.7818	0.6113	7.3765	0.6235	0.3887	2.6641
		1.25	0.7122	0.5072	7.8540	0.7020	0.4928	3.1416
		1.35	0.7818	0.6113	8.2315	0.6235	0.3887	3.6191
		1.45	0.9566	0.9151	8.9968	0.2914	0.0849	4.2844
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$T_n$		$T_n^2$		$T_n'$		$R$		$R^2$		$R'$	
$\frac{P}{.005}$	$\frac{r}{.41}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9556}$	$\frac{T_n^2}{.9133}$	$\frac{T_n'}{.4278}$	$\frac{R}{.2911}$	$\frac{R^2}{.0847}$	$\frac{R'}{2.0010}$	$\frac{R'^2}{2.6651}$	$\frac{T_n}{.9556}$	$\frac{T_n^2}{.9133}$	$\frac{T_n'}{.4278}$	$\frac{R}{.2911}$	$\frac{R^2}{.0847}$	$\frac{R'}{2.0010}$
		0.15	0.7803	0.6088	1.0926	0.6222	0.3872	2.6651							
		0.25	0.7102	0.5044	1.5708	0.7000	0.4901	3.1416							
		0.35	0.7782	0.6055	2.0498	0.6206	0.3851	3.6166							
		0.45	0.9430	0.8887	2.7154	0.2888	0.0834	4.2644							
		0.50	0.9831	0.9782	3.1416	0.0077	0.0001	3.1416							
		0.55	0.9461	0.8950	3.5674	0.2883	0.0831	2.0232							
		0.65	0.7750	0.6006	4.2320	0.6181	0.3820	2.6587							
		0.75	0.7062	0.4987	4.7124	0.6962	0.4846	3.1416							
		0.85	0.7729	0.5974	5.1936	0.6164	0.3800	3.6131							
		0.95	0.9385	0.8808	5.8590	0.2862	0.0819	4.2423							
		1.00	0.9783	0.9571	6.2832	0.0151	0.0002	3.1416							
		1.05	0.9365	0.8773	6.7070	0.2857	0.0815	2.0453							
		1.15	0.7693	0.5925	7.3715	0.6140	0.3770	2.6722							
		1.25	0.7022	0.4931	7.8540	0.6923	0.4793	3.1416							
		1.35	0.7677	0.5893	8.3374	0.6124	0.3750	3.6096							
		1.45	0.9292	0.8633	9.0025	0.2838	0.0805	4.2202							
		1.50	0.9677	0.9365	9.4248	0.0225	0.0005	3.1416							

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{e - \sin^2\theta}}{\lambda}$$

$$P = \frac{e \tan \delta}{e - \sin^2\theta}$$

P	r	ds	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	R	R <sup>2</sup>	R'
.010	.41	0.05	0.9547	0.9114	0.4276	0.2908	0.0846	2.0032
		0.15	0.7787	0.6063	1.0920	0.6210	0.3856	2.6662
		0.25	0.7082	0.5015	1.5708	0.6981	0.4873	3.1416
		0.35	0.7745	0.5998	2.0514	0.6177	0.3815	3.6142
		0.45	0.9394	0.8826	2.7172	0.2865	0.0821	4.2445
		0.50	0.9783	0.9571	3.1416	0.0151	0.0002	3.1416
		0.55	0.9357	0.8755	3.5652	0.2855	0.0815	2.0475
		0.65	0.7682	0.5901	4.2292	0.6128	0.3755	2.6733
		0.75	0.7002	0.4903	4.7174	0.6904	0.4767	3.1416
		0.85	0.7640	0.5837	5.1973	0.6096	0.3716	3.6071
		0.95	0.9209	0.8480	5.8627	0.2818	0.0794	4.2003
		1.00	0.9573	0.9164	6.2832	0.0296	0.0009	3.1416
		1.05	0.9172	0.8412	6.7029	0.2810	0.0789	2.0917
		1.15	0.7578	0.5743	7.3666	0.6049	0.3659	2.6804
		1.25	0.6923	0.4793	7.8540	0.6829	0.4664	3.1416
		1.35	0.7537	0.5680	8.3430	0.6018	0.3622	3.5999
		1.45	0.9028	0.8150	9.0080	0.2779	0.0773	4.1564
		1.50	0.9369	0.8779	9.4248	0.0435	0.0019	3.1416

**REPORT NO. NADC-EL-52195**

$$P = \frac{e \tan \delta}{e - \sin 2\theta}$$

$$ds = \frac{\kappa}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.42}$	$\frac{ds}{.05}$	$\frac{T_n}{.9538}$	$\frac{T_n^2}{.9096}$	$\frac{T_n^3}{.8445}$	$\frac{R}{.3006}$	$\frac{R^2}{.0904}$	$\frac{R^3}{.02708}$
0.000	0.15	0.05	0.7713	0.5949	1.1002	0.6364	0.4051	2.6710
	0.25	0.05	0.7001	0.4901	1.5708	0.7140	0.5099	3.1416
	0.35	0.05	0.7713	0.5949	2.0413	0.6364	0.4051	3.6121
	0.45	0.05	0.9538	0.9096	2.7071	0.3006	0.0904	4.2779
	0.50	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.9538	0.9538	0.9096	3.5761	0.3006	0.0904	2.0053
	0.65	0.7713	0.7713	0.5949	4.2418	0.6364	0.4051	2.6710
	0.75	0.7001	0.7001	0.4901	4.7124	0.7140	0.5099	3.1416
	0.85	0.7713	0.7713	0.5949	5.1829	0.6364	0.4051	3.6121
	0.95	0.9538	0.9538	0.9096	5.6487	0.3006	0.0904	4.2779
1.00	1.00	1.0000	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05	1.05	0.9538	0.9538	0.9096	6.7177	0.3006	0.0904	2.0053
1.15	1.15	0.7713	0.7713	0.5949	7.3834	0.6364	0.4051	2.6710
1.25	1.25	0.7001	0.7001	0.4901	7.8540	0.7140	0.5099	3.1416
1.35	1.35	0.7713	0.7713	0.5949	8.3245	0.6364	0.4051	3.6121
1.45	1.45	0.9538	0.9538	0.9096	8.9903	0.3006	0.0904	4.2779
1.50	1.50	1.0000	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin 2\theta}$$

$$ds = \frac{\lambda}{\lambda} \sqrt{e - \sin 2\theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.005	.42	0.05	0.9523	0.9078	0.4343	0.3003	0.0902	2.0075
		0.15	0.7693	0.5925	1.0996	0.6352	0.4034	2.6721
		0.25	0.6982	0.4875	1.5708	0.7121	0.5071	3.1416
		0.35	0.7677	0.5894	2.0430	0.6335	0.4013	3.6098
		0.45	0.9450	0.8931	2.7090	0.2979	0.0888	4.2581
		0.50	0.9889	0.9779	3.1416	0.0079	0.0001	3.1416
		0.55	0.9431	0.8895	3.5737	0.2974	0.0884	2.0295
		0.65	0.7646	0.5847	4.2389	0.6310	0.3981	2.6755
		0.75	0.6943	0.4821	4.7124	0.7082	0.5015	3.1416
		0.85	0.7626	0.5816	5.1868	0.6293	0.3961	3.6063
		0.95	0.9355	0.8752	5.8527	0.2952	0.0871	4.2360
		1.00	0.9779	0.9564	6.2832	0.0157	0.0002	3.1416
		1.05	0.9336	0.8716	6.7132	0.2947	0.0868	2.0515
		1.15	0.7595	0.5769	7.3782	0.6269	0.3930	2.6789
		1.25	0.6905	0.4768	7.8540	0.7044	0.4961	3.1416
		1.35	0.7575	0.5738	8.3307	0.6252	0.3909	3.6029
		1.45	0.9261	0.8576	8.9964	0.2927	0.0857	4.2140
		1.50	0.9672	0.9354	9.4248	0.0232	0.0005	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.42}$	$\frac{ds}{.05}$	$\frac{T_n}{.9518}$	$\frac{T_n^2}{.9059}$	$\frac{T'_n}{0.4341}$	$\frac{R}{0.3000}$	$\frac{R^2}{0.0900}$	$\frac{R'}{2.0097}$
		0.05	0.9518	0.9059	0.4341	0.3000	0.0900	2.0097
		0.15	0.7682	0.5902	1.0989	0.6339	0.4018	2.6731
		0.25	0.6963	0.4848	1.5708	0.7101	0.5043	3.1416
		0.35	0.7641	0.5839	2.0445	0.6306	0.3976	3.6074
		0.45	0.9364	0.8769	2.7109	0.2955	0.0873	4.2382
		0.50	0.9779	0.9564	3.1416	0.0157	0.0002	3.1416
		0.55	0.9327	0.8699	3.5714	0.2944	0.0867	2.0537
		0.65	0.7580	0.5746	4.2359	0.6256	0.3914	2.6800
		0.75	0.6886	0.4741	4.7124	0.7025	0.4934	3.1416
		0.85	0.7539	0.5684	5.1306	0.6224	0.3874	3.6004
		0.95	0.9177	0.8422	5.8557	0.2906	0.0844	4.1943
		1.00	0.9566	0.9151	6.2832	0.0307	0.0009	3.1416
		1.05	0.9140	0.8355	6.7089	0.2897	0.0839	2.0977
		1.15	0.7478	0.5593	7.3731	0.6177	0.3815	2.6870
		1.25	0.6809	0.4636	7.8540	0.6949	0.4830	3.1416
		1.35	0.7438	0.5532	8.3366	0.6146	0.3777	3.5934
		1.45	0.8995	0.8091	9.0022	0.2866	0.0821	4.1506
		1.50	0.9359	0.8760	9.4248	0.0450	0.0020	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.43}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9507}$	$\frac{T_n^2}{.9039}$	$\frac{T_n'}{0.4413}$	$\frac{R}{0.3100}$	$\frac{R^2}{0.0961}$	$\frac{R'}{2.0121}$
		0.05	0.9507	0.9039	0.4413	0.3100	0.0961	2.0121
		0.15	0.7606	0.5785	1.1073	0.6492	0.4215	2.6781
		0.25	0.6879	0.4732	1.5708	0.7258	0.5268	3.1416
		0.35	0.7606	0.5785	2.0343	0.6492	0.4215	3.6051
		0.45	0.9507	0.9039	2.7003	0.3100	0.0961	4.2711
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9507	0.9039	3.5829	0.3100	0.0961	2.0121
		0.65	0.7606	0.5785	4.2489	0.6492	0.4215	2.6781
		0.75	0.6879	0.4732	4.7124	0.7258	0.5268	3.1416
		0.85	0.7606	0.5785	5.1759	0.6492	0.4215	3.6051
		0.95	0.9507	0.9039	5.8419	0.3100	0.0961	4.2711
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9507	0.9039	6.7245	0.3100	0.0961	2.0121
		1.15	0.7606	0.5785	7.3905	0.6492	0.4215	2.6781
		1.25	0.6879	0.4732	7.8540	0.7258	0.5268	3.1416
		1.35	0.7606	0.5785	8.3175	0.6492	0.4215	3.6051
		1.45	0.9507	0.9039	8.9835	0.3100	0.0961	4.2711
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{K}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$T_n$		$T_n^2$		$R$		$R^2$		$R'$	
$\frac{P}{.005}$	$\frac{r}{.43}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9498}$	$\frac{T_n^2}{.9020}$	$\frac{T_n}{1.1066}$	$\frac{T_n^2}{1.2345}$	$\frac{T_n}{1.5708}$	$\frac{R}{0.3097}$	$\frac{R^2}{0.0959}$	$\frac{R'}{2.0143}$	$\frac{R'^2}{4.0574}$	$\frac{R'}{2.6791}$	$\frac{R'^2}{7.1771}$
0.15	0.7591	0.5762	0.9498	0.9020	1.1066	1.2345	1.5708	0.6479	0.4198	2.6791	7.1771	3.1416	9.8696
0.25	0.6860	0.4707	0.7571	0.5732	0.8462	0.7161	0.8462	0.7238	0.5240	3.1416	9.8696	3.6028	12.9801
0.35	0.7571	0.5732	0.9420	0.8873	0.9420	0.8873	0.9420	0.6462	0.4176	3.6028	12.9801	4.2514	18.0729
0.45	0.9420	0.8873	0.9887	0.9775	0.9887	0.9775	0.9887	0.3072	0.0944	4.2514	18.0729	3.1416	9.8696
0.50	0.9887	0.9775	0.9400	0.8837	0.9400	0.8837	0.9400	0.0082	0.0001	3.1416	9.8696	2.0361	4.1456
0.55	0.9400	0.8837	0.7541	0.5686	0.7541	0.5686	0.7541	0.3066	0.0940	2.0361	4.1456	2.6824	7.1985
0.65	0.7541	0.5686	0.6823	0.4656	0.6823	0.4656	0.6823	0.6437	0.4144	2.6824	7.1985	3.1416	9.8696
0.75	0.6823	0.4656	0.7521	0.5656	0.7521	0.5656	0.7521	0.7200	0.5183	3.1416	9.8696	3.5994	12.9501
0.85	0.7521	0.5656	0.9323	0.8693	0.9323	0.8693	0.9323	0.6420	0.4122	3.5994	12.9501	4.2296	17.8921
0.95	0.9323	0.8693	0.9776	0.9556	0.9776	0.9556	0.9776	0.3043	0.0926	4.2296	17.8921	3.1416	9.8696
1.00	0.9776	0.9556	0.9304	0.8657	0.9304	0.8657	0.9304	0.0162	0.0003	3.1416	9.8696	2.0580	4.2345
1.05	0.9304	0.8657	0.7491	0.5611	0.7491	0.5611	0.7491	0.3038	0.0923	2.0580	4.2345	2.6858	7.2051
1.15	0.7491	0.5611	0.6786	0.4605	0.6786	0.4605	0.6786	0.6396	0.4090	2.6858	7.2051	3.1416	9.8696
1.25	0.6786	0.4605	0.7471	0.5581	0.7471	0.5581	0.7471	0.7161	0.5128	3.1416	9.8696	3.5961	12.9261
1.35	0.7471	0.5581	0.9229	0.8517	0.9229	0.8517	0.9229	0.6379	0.4069	3.5961	12.9261	4.2077	17.7051
1.45	0.9229	0.8517	0.9666	0.9344	0.9666	0.9344	0.9666	0.3017	0.0910	4.2077	17.7051	3.1416	9.8696
1.50	0.9666	0.9344						0.0240	0.0006	3.1416	9.8696		

REPORT NO. NADC-EL-52195

$$P = \frac{c \tan \theta}{c - \sin 2\theta}$$

$$ds = \frac{\lambda}{\epsilon - \sin^2 \theta}$$

$P$	$r$	$\frac{ds}{dr}$	$\frac{T_n}{T_n'}$	$\frac{T_n^2}{T_n'^2}$	$\frac{R}{R'}$	$\frac{R^2}{R'^2}$	$\frac{R'}{R^2}$
0.010	0.43	0.05	0.9488	0.9002	0.4408	0.3093	2.0164
		0.15	0.7576	0.5739	1.1059	0.6467	2.6601
		0.25	0.6842	0.4681	1.5708	0.7219	3.1416
		0.35	0.7536	0.5679	2.0376	0.6433	3.5004
		0.45	0.9233	0.8711	2.7044	0.3046	4.2317
		0.50	0.9776	0.9556	3.1416	0.0162	3.1416
		0.55	0.9295	0.8639	3.5779	0.3035	2.0602
		0.65	0.7476	0.5589	4.2428	0.6383	2.6565
		0.75	0.6767	0.4580	4.7124	0.7142	3.1416
		0.85	0.7436	0.5529	5.1839	0.6351	3.5937
		0.95	0.9144	0.8362	5.8504	0.2995	4.1880
		1.00	0.9559	0.9137	6.2832	0.0317	3.1416
		1.05	0.9107	0.8294	6.7151	0.2986	2.1039
		1.15	0.7377	0.5441	7.3798	0.6303	2.6936
		1.25	0.6693	0.4480	7.8540	0.7067	3.1416
		1.35	0.7337	0.5383	8.3300	0.6271	3.5868
		1.45	0.8961	0.8030	8.9962	0.2953	4.1446
		1.50	0.9349	0.8740	9.4248	0.0465	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R'}$
$\frac{P}{.000}$	$\frac{r}{.44}$	$\frac{d_s}{.05}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R'}$
		0.05	0.9476	0.8979	0.4483	0.3195	0.1021	2.0191	2.0191
		0.15	0.7497	0.5620	1.1145	0.6618	0.4380	2.6853	2.6853
		0.25	0.6756	0.4564	1.5708	0.7373	0.5436	3.1416	3.1416
		0.35	0.7497	0.5620	2.0271	0.6618	0.4380	3.5979	3.5979
		0.45	0.9476	0.8979	2.6933	0.3195	0.1021	4.2641	4.2641
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708	1.5708
		0.55	0.9476	0.8979	3.5899	0.3195	0.1021	2.0191	2.0191
		0.65	0.7497	0.5620	4.2561	0.6618	0.4380	2.6853	2.6853
		0.75	0.6756	0.4564	4.7124	0.7373	0.5436	3.1416	3.1416
		0.85	0.7497	0.5620	5.1687	0.6618	0.4380	3.5979	3.5979
		0.95	0.9476	0.8979	5.8349	0.3195	0.1021	4.2641	4.2641
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708	1.5708
		1.05	0.9476	0.8979	6.7315	0.3195	0.1021	2.0191	2.0191
		1.15	0.7497	0.5620	7.3977	0.6618	0.4380	2.6853	2.6853
		1.25	0.6756	0.4564	7.8540	0.7373	0.5436	3.1416	3.1416
		1.35	0.7497	0.5620	8.3103	0.6618	0.4380	3.5979	3.5979
		1.45	0.9476	0.8979	8.9765	0.3195	0.1021	4.2641	4.2641
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708	1.5708

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{a - \sin^2 \theta}$$

$\frac{P}{r}$	$\frac{r}{d_s}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n}$	$\frac{R}{R^2}$	$\frac{R^2}{R}$
0.05	0.44	0.9466	0.8960	0.3192	0.1019
	0.15	0.7487	0.5598	0.5605	0.4363
	0.25	0.6738	0.4540	0.7353	0.5407
	0.35	0.7462	0.5565	0.6563	0.4341
	0.45	0.9387	0.8812	0.3166	0.1003
	0.50	0.9885	0.9771	0.0085	0.0001
	0.55	0.9368	0.8776	0.3160	0.0999
	0.65	0.7433	0.5525	0.6563	0.4307
	0.75	0.6707	0.4492	0.7314	0.5350
	0.85	0.7413	0.5496	0.6546	0.4285
	0.95	0.9290	0.8631	0.3137	0.0984
	1.00	0.9772	0.9548	0.0168	0.0003
	1.05	0.9271	0.8595	0.3131	0.0980
	1.15	0.7384	0.5453	0.6521	0.4252
	1.25	0.6666	0.4444	0.7276	0.5294
	1.35	0.7365	0.5424	0.6504	0.4231
	1.45	0.9195	0.8454	0.3109	0.0967
	1.50	0.9660	0.9332	0.0248	0.0006

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.010	0.44	0.05	0.9456	0.8942	0.4478	0.3189	0.1017	2.0234
		0.15	0.7467	0.5576	1.1130	0.6593	0.4346	2.6872
		0.25	0.6720	0.4516	1.5708	0.7334	0.5378	3.1416
		0.35	0.7428	0.5518	2.0306	0.6559	0.4301	3.5934
		0.45	0.9300	0.8649	2.6977	0.3139	0.0986	4.2250
		0.50	0.9772	0.9548	3.1416	0.0168	0.0003	3.1416
		0.55	0.9262	0.8578	3.5846	0.3128	0.0978	2.0669
		0.65	0.7370	0.5431	4.2497	0.6508	0.4236	2.6937
		0.75	0.6648	0.4420	4.7124	0.7257	0.5267	3.1416
		0.85	0.7331	0.5374	5.1770	0.6476	0.4193	3.5868
		0.95	0.9110	0.8299	5.8439	0.3086	0.0953	4.1816
		1.00	0.9551	0.9122	6.2832	0.0327	0.0011	3.1416
		1.05	0.9073	0.8231	6.7215	0.3077	0.0947	2.1103
		1.15	0.7273	0.5289	7.3865	0.6427	0.4131	2.7004
		1.25	0.6576	0.4325	7.8540	0.7182	0.5158	3.1416
		1.35	0.7234	0.5233	8.3235	0.6395	0.4090	3.5801
		1.45	0.8925	0.7966	8.9900	0.3042	0.0926	4.1384
		1.50	0.9338	0.8720	9.4248	0.0480	0.0023	3.1416

**REPORT NO. NADC-EL-52195**

$$p = \frac{c \tan \delta}{c - \sin 2\theta}$$

$$ds = \frac{r}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.45}$	$\frac{ds}{.05}$	$\frac{T_n}{0.9442}$	$\frac{T_n^2}{0.8916}$	$\frac{T_n'}{0.4556}$	$\frac{R}{0.3293}$	$\frac{R^2}{0.1084}$	$\frac{R'}{2.0264}$
	0.15	0.05	0.9442	0.8916	0.4556	0.3293	0.1084	2.0264
	0.25	0.15	0.7385	0.5454	1.1218	0.6743	0.4546	2.6926
	0.35	0.25	0.6632	0.4398	1.5708	0.7484	0.5602	3.1416
	0.45	0.35	0.7385	0.5454	2.0198	0.6743	0.4546	3.5906
	0.50	0.45	0.9442	0.8916	2.6860	0.3293	0.1084	4.2568
	0.55	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.65	0.55	0.9442	0.8916	3.5971	0.3293	0.1084	2.0264
	0.75	0.65	0.7385	0.5454	4.2634	0.6743	0.4546	2.6926
	0.85	0.75	0.6632	0.4398	4.7124	0.7484	0.5602	3.1416
	0.95	0.85	0.7385	0.5454	5.1614	0.6743	0.4546	3.5906
	1.00	0.95	0.9442	0.8916	5.8276	0.3293	0.1084	4.2568
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9442	0.8916	6.7387	0.3293	0.1084	2.0264
		1.15	0.7385	0.5454	7.4050	0.6743	0.4546	2.6926
		1.25	0.6632	0.4398	7.8540	0.7484	0.5602	3.1416
		1.35	0.7385	0.5454	8.3030	0.6743	0.4546	3.5906
		1.45	0.9442	0.8916	8.9692	0.3293	0.1084	4.2568
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52185

$$P = \frac{\epsilon \tan \delta}{d - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{r}$	$\frac{r}{ds}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{R}{R^2}$	$\frac{R^2}{R}$	$\frac{R'}{R'}$
.005	.45	0.9432	0.8897	0.4553	0.3289	0.1082	2.0285
	0.15	0.7371	0.5433	1.1210	0.6729	0.4529	2.6935
	0.25	0.6615	0.4375	1.5708	0.7465	0.5573	3.1416
	0.35	0.7352	0.5405	2.0216	0.6712	0.4505	3.5884
	0.45	0.9353	0.8748	2.6884	0.3263	0.1064	4.2374
	0.50	0.9883	0.9767	2.1416	0.0088	0.0001	3.1416
	0.55	0.9334	0.8711	3.5943	0.3256	0.1060	2.0501
	0.65	0.7323	0.5363	4.2600	0.6687	0.4471	2.6966
	0.75	0.6580	0.4330	4.7124	0.7426	0.5515	3.1416
	0.85	0.7304	0.5335	5.1658	0.6670	0.4448	3.5853
	0.95	0.9255	0.8566	5.8325	0.3231	0.1044	4.2158
	1.00	0.9767	0.9540	6.2832	0.0173	0.0003	3.1416
	1.05	0.9236	0.8531	6.7334	0.3226	0.1040	2.0717
	1.15	0.7276	0.5293	7.3991	0.6644	0.4415	2.6998
	1.25	0.6546	0.4284	7.8540	0.7388	0.5459	3.1416
	1.35	0.7257	0.5266	8.3099	0.6628	0.4392	3.5821
	1.45	0.9159	0.8389	8.9766	0.3202	0.1026	4.1942
	1.50	0.9554	0.9321	9.4248	0.0257	0.0007	3.1416

## REPORT NO. NADC-EL-52195

p	r	ds	$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$		$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$P = \frac{e \tan \theta}{e - \sin^2 \theta}$		$\frac{R^2}{R}$	$\frac{R'}{R}$
			$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$			$\frac{R}{R}$	$\frac{R^2}{R}$		
.010	.45	0.05	0.5422	0.8878	0.4550	0.3236	0.1080	2.0307		
		0.15	0.7356	0.5112	1.1202	0.6717	0.4511	2.6944		
		0.25	0.6597	0.4353	1.5708	0.7446	0.5544	3.1416		
		0.35	0.7318	0.5356	2.0234	0.6682	0.4465	3.5862		
		0.45	0.9265	0.8584	2.6907	0.3234	0.1046	4.2180		
		0.50	0.9767	0.9540	3.1416	0.0173	0.0003	3.1416		
		0.55	0.9226	0.8513	3.5915	0.3223	0.1039	2.0738		
		0.65	0.7261	0.5273	4.2567	0.6632	0.4398	2.7008		
		0.75	0.6528	0.4262	4.7124	0.7369	0.5431	3.1416		
		0.85	0.7224	0.5218	5.1700	0.6599	0.4354	3.5798		
		0.95	0.9074	0.8233	5.8372	0.3179	0.1011	4.1748		
		1.00	0.9543	0.9107	6.2832	0.0338	0.0011	3.1415		
		1.05	0.9036	0.8165	6.7282	0.3169	0.1004	2.1170		
		1.15	0.7167	0.5136	7.3934	0.6550	0.4290	2.7072		
		1.25	0.6459	0.4172	7.8540	0.7295	0.5321	3.1416		
		1.35	0.7129	0.5083	8.3165	0.5518	0.4248	3.5734		
		1.45	0.8888	0.7999	8.9835	0.3133	0.0982	4.1320		
		1.50	0.9327	0.8699	9.4248	0.0496	0.0025	3.1416		

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$P = \frac{e \tan \delta}{4 \cdot \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.000	.46	0.05	0.9407	0.8849	0.4631	0.3392	0.1151	2.0339
		0.15	0.7272	0.5288	1.1292	0.6865	0.4712	2.7000
		0.25	0.6507	0.4234	1.5708	0.7593	0.5766	3.1416
		0.35	0.7272	0.5288	2.0124	0.6865	0.4712	3.5832
		0.45	0.9407	0.8849	2.6785	0.3392	0.1151	4.2493
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9407	0.8849	3.6047	0.3392	0.1151	2.0339
		0.65	0.7272	0.5288	4.2708	0.6865	0.4712	2.7000
		0.75	0.6507	0.4234	4.7124	0.7593	0.5766	3.1416
		0.85	0.7272	0.5288	5.1540	0.6865	0.4712	3.5832
		0.95	0.9407	0.8849	5.8201	0.3392	0.1151	4.2493
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9407	0.8849	6.7463	0.3392	0.1151	2.0339
		1.15	0.7272	0.5288	7.4124	0.6865	0.4712	2.7000
		1.25	0.6507	0.4234	7.8540	0.7593	0.5766	3.1416
		1.35	0.7272	0.5288	8.2956	0.6865	0.4712	3.5832
		1.45	0.9407	0.8849	8.9617	0.3392	0.1151	4.2493
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.005}$		$\frac{r}{.46}$	$\frac{ds}{.05}$	$\frac{ds}{\lambda} = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$	$\frac{T_n}{.9397}$	$\frac{T_n^2}{.8830}$	$\frac{T_n}{.4625}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$	R	R <sup>2</sup>	R'
	0.05		0.15	0.7258	0.8490	0.5267	1.1284	0.3389	0.6852	0.4694	2.0360
	0.25		0.25	0.7239	0.8490	0.4213	1.5708	0.7574	0.6852	0.5736	2.7009
	0.35		0.35	0.7239	0.8490	0.5240	2.0143	0.5834	0.7574	0.4671	3.1416
	0.45		0.45	0.9317	0.8490	0.8681	2.6810	0.3361	0.5834	0.1129	4.2300
	0.50		0.50	0.9880	0.8490	0.9762	3.1416	0.0091	0.3361	0.0001	3.1416
	0.55		0.55	0.9297	0.8490	0.8644	3.6017	0.3354	0.0091	0.1125	2.0575
	0.65		0.65	0.7211	0.8490	0.5200	4.2673	0.5808	0.3354	0.4635	2.7039
	0.75		0.75	0.6457	0.8490	0.4169	4.7124	0.7536	0.5808	0.5678	3.1416
	0.85		0.85	0.7193	0.8490	0.5174	5.1585	0.6791	0.7536	0.4612	3.5780
	0.95		0.95	0.9219	0.8490	0.8499	5.8253	0.3328	0.6791	0.1108	4.2086
	1.00		1.00	0.9763	0.8490	0.9532	6.2832	0.0179	0.3328	0.0003	3.1416
	1.05		1.05	0.9199	0.8490	0.8463	6.7406	0.3322	0.0179	0.1104	2.0789
	1.15		1.15	0.7165	0.8490	0.5134	7.4063	0.6766	0.3322	0.4578	2.7070
	1.25		1.25	0.6424	0.8490	0.4126	7.8540	0.7497	0.6766	0.5521	3.1416
	1.35		1.35	0.7147	0.8490	0.5107	8.3027	0.6749	0.7497	0.4555	3.5750
	1.45		1.45	0.9122	0.8490	0.8321	8.9605	0.3298	0.6749	0.1088	4.1871
	1.50		1.50	0.9648	0.8490	0.9308	9.4246	0.0265	0.3298	0.0007	3.1416

## REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\epsilon}$	$\frac{r}{\epsilon}$	$\frac{d_s}{\epsilon}$	$\frac{T_n}{\epsilon}$	$\frac{T_n^2}{\epsilon}$	$\frac{T_n}{\epsilon}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
0.010	0.46	0.05	0.9387	0.8812	0.4626	0.3385	0.1146	2.0382
		0.15	0.7244	0.5247	2.1276	0.6839	0.4677	2.7018
		0.25	0.6474	0.4191	1.5708	0.7555	0.5707	3.1416
		0.35	0.7207	0.5194	2.0162	0.6804	0.4630	3.5790
		0.45	0.9229	0.8517	2.6834	0.3331	0.1110	4.2107
		0.50	0.9763	0.9532	3.1416	0.0179	0.0003	3.1416
		0.55	0.9190	0.8445	3.5987	0.3319	0.1102	2.0811
		0.65	0.7151	0.5114	4.2639	0.6755	0.4561	2.7079
		0.75	0.6407	0.4105	4.7124	0.7479	0.5593	3.1416
		0.85	0.7114	0.5061	5.1630	0.6720	0.4516	3.5728
		0.95	0.9036	0.8165	5.8302	0.3273	0.1072	4.1679
		1.00	0.9535	0.9091	6.2832	0.0350	0.0012	3.1416
		1.05	0.8998	0.8096	6.7351	0.3263	0.1065	2.1239
		1.15	0.7059	0.4983	7.4003	0.6671	0.4450	2.7142
		1.25	0.6340	0.4020	7.8540	0.7404	0.5482	3.1416
		1.35	0.7072	0.4931	8.3096	0.6639	0.4407	3.5565
		1.45	0.8848	0.7830	8.9768	0.3225	0.1040	4.1253
		1.50	0.9315	0.8677	9.4248	0.0512	0.0026	3.1416

## REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$P = \frac{\epsilon \tan\delta}{\epsilon - \sin^2\theta}$				
$\frac{P}{0.00}$	$\frac{r}{0.47}$	$\frac{d_s}{0.05}$	$\frac{T_n}{0.9370}$	$\frac{T_n^2}{0.8780}$	$\frac{T_n}{0.4710}$	$\frac{R}{0.3493}$	$\frac{R^2}{0.1220}$	$\frac{R'}{2.0418}$
0.15		0.15	0.7156	0.5121	1.1367	0.6985	0.4879	2.7075
0.25		0.25	0.6381	0.4072	1.5708	0.7699	0.5928	3.1416
0.35		0.35	0.7156	0.5121	2.0049	0.6985	0.4879	3.5757
0.45		0.45	0.9370	0.8780	2.6706	0.3493	0.1220	4.2414
0.50		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55		0.55	0.9370	0.8780	3.6125	0.3493	0.1220	2.0418
0.65		0.65	0.7156	0.5121	4.2783	0.6985	0.4879	2.7075
0.75		0.75	0.6381	0.4072	4.7124	0.7699	0.5928	3.1416
0.85		0.85	0.7156	0.5121	5.1465	0.6985	0.4879	3.5757
0.95		0.95	0.9370	0.8780	5.8122	0.3493	0.1220	4.2414
1.00		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05		1.05	0.9370	0.8780	6.7541	0.3493	0.1220	2.0418
1.15		1.15	0.7156	0.5121	7.4198	0.6985	0.4879	2.7075
1.25		1.25	0.6381	0.4072	7.8540	0.7699	0.5928	3.1416
1.35		1.35	0.7156	0.5121	8.2881	0.6985	0.4879	3.5757
1.45		1.45	0.9370	0.8780	8.9538	0.3493	0.1220	4.2414
1.50		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

## REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

$\frac{P}{.005}$	$\frac{r}{.47}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9260}$	$\frac{T_n^2}{0.8761}$	$\frac{T_n'}{0.4707}$	$\frac{R}{0.3490}$	$\frac{R^2}{0.1218}$	$\frac{R'}{2.0439}$
		0.05	0.9260	0.8761	0.4707	0.3490	0.1218	2.0439
		0.15	0.7143	0.5102	1.1358	0.6972	0.4861	2.7083
		0.25	0.6365	0.4052	1.5708	0.7680	0.5898	3.1416
		0.35	0.7125	0.5076	2.0069	0.6954	0.4836	3.5737
		0.45	0.9279	0.8611	2.6733	0.3461	0.1198	4.2223
		0.50	0.9878	0.9758	3.1416	0.0094	0.0001	3.1416
		0.55	0.9259	0.8574	3.6093	0.3454	0.1193	2.0651
		0.65	0.7098	0.5037	4.2747	0.6928	0.4800	2.7113
		0.75	0.6333	0.4011	4.7124	0.7642	0.5840	3.1416
		0.85	0.7080	0.5012	5.1512	0.6911	0.4777	3.5707
		0.95	0.9180	0.8428	5.8177	0.3427	0.1174	4.2010
		1.00	0.9759	0.9523	6.2832	0.0185	0.0003	3.1416
		1.05	0.9161	0.8392	6.7481	0.3420	0.1170	2.0864
		1.15	0.7053	0.4974	7.4135	0.6886	0.4741	2.7143
		1.25	0.6301	0.3970	7.8540	0.7604	0.5782	3.1416
		1.35	0.7035	0.4949	8.2955	0.6869	0.4718	3.5677
		1.45	0.9083	0.8249	8.9621	0.3396	0.1153	4.1798
		1.50	0.9641	0.9295	9.4248	0.0274	0.0008	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{e - \sin^2\theta}}{\lambda}$$

$$P = \frac{e \tan \delta}{e - \sin^2\theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub> '	R	R <sup>2</sup>	R'
.010	.47	0.05	0.9350	0.8742	0.4704	0.3486	0.1215	2.0460
		0.15	0.7129	0.5082	1.1350	0.6959	0.4842	2.7092
		0.25	0.6349	0.4031	1.5708	0.7661	0.5869	3.1416
		0.35	0.7093	0.5031	2.0088	0.6924	0.4794	3.5716
		0.45	0.9190	0.8446	2.6758	0.3430	0.1176	4.2032
		0.50	0.9759	0.9523	3.1416	0.0185	0.0003	3.1416
		0.55	0.9151	0.8374	3.6062	0.3417	0.1168	2.0885
		0.65	0.7039	0.4955	4.2711	0.6873	0.4724	2.7152
		0.75	0.6285	0.3950	4.7124	0.7585	0.5754	3.1416
		0.85	0.7003	0.4904	5.1558	0.6840	0.4678	3.5656
		0.95	0.8996	0.8093	5.8230	0.3370	0.1135	4.1606
		1.00	0.9526	0.9075	6.2832	0.0361	0.0013	3.1416
		1.05	0.8958	0.8024	6.7423	0.3359	0.1128	2.1310
		1.15	0.6949	0.4830	7.4074	0.6790	0.4611	2.7213
		1.25	0.6221	0.3870	7.8540	0.7511	0.5642	3.1416
		1.35	0.6914	0.4780	8.3026	0.6758	0.4567	3.5595
		1.45	0.8807	0.7757	8.9699	0.3319	0.1102	4.1183
		1.50	0.9302	0.8654	9.4248	0.0529	0.0028	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.48}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9331}$	$\frac{T_n^2}{0.8706}$	$\frac{T_n'}{0.4791}$	$\frac{R}{0.3597}$	$\frac{R^2}{0.1294}$	$\frac{R'}{2.0499}$
		0.05	0.9331	0.8706	0.4791	0.3597	0.1294	2.0499
		0.15	0.7039	0.4954	1.1443	0.7103	0.5046	2.7150
		0.25	0.6255	0.3912	1.5708	0.7802	0.6088	3.1416
		0.35	0.7039	0.4954	1.9973	0.7103	0.5046	3.5681
		0.45	0.9331	0.8706	2.6625	0.3597	0.1294	4.2333
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9331	0.8706	3.6207	0.3597	0.1294	2.0499
		0.65	0.7039	0.4954	4.2858	0.7103	0.5046	2.7150
		0.75	0.6255	0.3912	4.7124	0.7802	0.6088	3.1416
		0.85	0.7039	0.4954	5.1389	0.7103	0.5046	3.5681
		0.95	0.9331	0.8706	5.8041	0.3597	0.1294	4.2333
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9331	0.8706	6.7623	0.3597	0.1294	2.0499
		1.15	0.7039	0.4954	7.4274	0.7103	0.5046	2.7150
		1.25	0.6255	0.3912	7.8540	0.7802	0.6088	3.1416
		1.35	0.7039	0.4954	8.2805	0.7103	0.5046	3.5681
		1.45	0.9331	0.8706	8.9457	0.3597	0.1294	4.2333
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$p = \frac{\epsilon \tan \theta}{\epsilon - \sin^2\theta}$				
$\frac{p}{.005}$	$\frac{r}{.48}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9321}$	$\frac{T_n^2}{0.8687}$	$\frac{T_n^3}{0.4788}$	$\frac{R}{0.3593}$	$\frac{R^2}{0.1291}$	$\frac{R'}{2.0520}$
		0.15	0.7026	0.4936	1.1434	0.7090	0.5027	2.7159
		0.25	0.6240	0.3893	1.5708	0.7783	0.6058	3.1416
		0.35	0.7008	0.4911	1.9993	0.7073	0.5002	3.5661
		0.45	0.9240	0.8537	2.6653	0.3563	0.1269	4.2143
		0.50	0.9876	0.9753	3.1416	0.0097	0.0001	3.1416
		0.55	0.9220	0.8500	3.6173	0.3555	0.1264	2.0731
		0.65	0.6982	0.4875	4.2821	0.7046	0.4965	2.7188
		0.75	0.6209	0.3855	4.7124	0.7745	0.5999	3.1416
		0.85	0.6064	0.4850	5.1438	0.7029	0.4941	3.5633
		0.95	0.9140	0.8354	5.8099	0.3527	0.1244	4.1932
		1.00	0.9754	0.9514	6.2832	0.0191	0.0004	3.1416
		1.05	0.9120	0.8317	6.7559	0.3520	0.1239	2.0942
		1.15	0.6938	0.4814	7.4209	0.7004	0.4905	2.7216
		1.25	0.6178	0.3817	7.8540	0.7708	0.5941	3.1416
		1.35	0.6921	0.4790	8.2882	0.5987	0.4891	3.5604
		1.45	0.9041	0.8175	8.9545	0.3495	0.1221	4.1721
		1.50	0.9634	0.9282	9.4248	0.0283	0.0008	3.1416

REPORT NO. NADC-EL-52195

$$p = \frac{a \tan \delta}{a - \sin 2\theta}$$

$$ds = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$\frac{p}{r}$	$\frac{r}{ds}$	$\frac{T_n}{T_{n-1}}$	$\frac{T_n^2}{T_{n-1}^2}$	$\frac{T_n}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R}$
0.010	0.05	0.9310	0.8668	0.4785	0.1288	2.0541
	0.15	0.7012	0.4917	1.1425	0.5008	2.7168
	0.25	0.6224	0.3874	1.5708	0.6028	3.1416
	0.35	0.6977	0.4869	2.0013	0.4959	3.5641
	0.45	0.9150	0.8372	2.6680	0.1247	4.1953
	0.50	0.9754	0.9514	3.1416	0.0004	3.1416
	0.55	0.9110	0.8299	3.6140	0.1237	2.0963
	0.65	0.6925	0.4796	4.2785	0.4887	2.7225
	0.75	0.6162	0.3797	4.7124	0.5912	3.1416
	0.85	0.6890	0.4747	5.1485	0.4840	3.5583
	0.95	0.8954	0.8018	5.8155	0.1202	4.1531
1.00	0.9517	0.9058	0.8282	6.2832	0.0014	3.1416
1.05	0.8916	0.7949	0.6321	6.7497	0.1195	2.1385
1.15	0.6238	0.4676	2.1416	7.4146	0.4771	2.7284
1.25	0.6100	0.3721	7.8540	8.7615	0.5799	3.1416
1.35	0.6803	0.4628	8.2956	9.6875	0.4727	3.5524
1.45	0.8764	0.7682	8.9627	10.3415	0.1166	4.1111
1.50	0.9290	0.8630	9.4248	10.0546	0.0030	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$p = \frac{\epsilon \tan\delta}{\epsilon - \sin^2\theta}$		$T_n$		$T_n^2$		$\frac{T_n}{R}$		$\frac{R^2}{R'}$	
$\frac{p}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{r}$	$\frac{T_n^2}{r}$	$\frac{T_n}{R}$	$\frac{T_n^2}{R}$	$\frac{T_n}{R}$	$\frac{T_n^2}{R}$	$\frac{R}{R'}$	$\frac{R^2}{R'}$	$\frac{R^2}{R'}$	$\frac{R^2}{R'}$
0.00	0.49	0.05	0.0289	0.8629	0.4875	0.3702	0.1371	2.0583	2.0583	2.0583	2.0583
		0.15	0.6920	0.4788	1.1519	0.7219	0.5212	2.7227	2.7227	2.7227	2.7227
		0.25	0.6128	0.3755	1.5708	0.7903	0.6245	3.1416	3.1416	3.1416	3.1416
		0.35	0.6920	0.4788	1.9897	0.7219	0.5212	3.5605	3.5605	3.5605	3.5605
		0.45	0.9289	0.8629	2.6540	0.5702	0.1371	4.2248	4.2248	4.2248	4.2248
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708	1.5708	1.5708	1.5708
		0.55	0.9289	0.8629	3.6291	0.3702	0.1371	2.0583	2.0583	2.0583	2.0583
		0.65	0.6920	0.4788	4.2935	0.7219	0.5212	2.7227	2.7227	2.7227	2.7227
		0.75	0.6128	0.3755	4.7124	0.7903	0.6245	3.1416	3.1416	3.1416	3.1416
		0.85	0.6920	0.4788	5.1312	0.7219	0.5212	3.5605	3.5605	3.5605	3.5605
		0.95	0.9289	0.8629	5.7956	0.3702	0.1371	4.2248	4.2248	4.2248	4.2248
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708	1.5708	1.5708	1.5708
		1.05	0.9289	0.8629	6.7707	0.3702	0.1371	2.0583	2.0583	2.0583	2.0583
		1.15	0.6920	0.4788	7.4351	0.7219	0.5212	2.7227	2.7227	2.7227	2.7227
		1.25	0.6128	0.3755	7.8540	0.7903	0.6245	3.1416	3.1416	3.1416	3.1416
		1.35	0.6920	0.4788	8.2728	0.7219	0.5212	3.5605	3.5605	3.5605	3.5605
		1.45	0.9289	0.8629	8.9372	0.3702	0.1371	4.2248	4.2248	4.2248	4.2248
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708	1.5708	1.5708	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$			$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$				
$\frac{P}{.005}$	$\frac{r}{.40}$	$\frac{d_s}{.05}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
		0.05	0.9279	0.8610	0.4872	0.1368	2.0604
		0.15	0.6907	0.4770	1.1510	0.5193	2.7236
		0.25	0.6113	0.3737	1.5708	0.7884	3.1416
		0.35	0.6890	0.4747	1.9917	0.7184	3.5585
		0.45	0.9198	0.8460	2.6570	0.1344	4.2060
		0.50	0.9873	0.9748	3.1416	0.0001	3.1416
		0.55	0.9177	0.8423	3.6255	0.1339	2.0813
		0.65	0.6864	0.4712	4.2897	0.5130	2.7263
		0.75	0.5083	0.3701	4.7124	0.6156	3.1416
		0.85	0.6847	0.4689	5.1363	0.5105	3.5558
		0.95	0.9097	0.8276	5.8018	0.1317	4.1851
		1.00	0.9749	0.9504	6.2832	0.0004	3.1416
		1.05	0.9077	0.8240	6.7639	0.1312	2.1023
		1.15	0.6822	0.4654	7.4284	0.5069	2.7291
		1.25	0.6054	0.3655	7.8540	0.6098	3.1416
		1.35	0.6805	0.4631	8.2807	0.5044	3.5529
		1.45	0.8098	0.8097	8.9465	0.1293	4.1642
		1.50	0.9627	0.9268	9.4248	0.0009	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{P}{.010}$	$\frac{r}{.49}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9269}$	$\frac{T_n^2}{0.8591}$	$\frac{T_n}{0.4869}$
					$\frac{R}{0.3694}$
					$\frac{R^2}{0.1365}$
					$\frac{R'}{2.0625}$
0.05	0.05	0.05	0.9269	0.8591	0.4869
0.15	0.15	0.15	0.6894	0.4753	1.1502
0.25	0.25	0.25	0.6098	0.3719	1.5708
0.35	0.35	0.35	0.6860	0.4706	1.9938
0.45	0.45	0.45	0.9107	0.8294	2.6599
0.50	0.50	0.50	0.9749	0.9504	3.1416
0.55	0.55	0.55	0.9067	0.8222	3.6220
0.65	0.65	0.65	0.5809	0.4637	4.2859
0.75	0.75	0.75	0.6039	0.3647	4.7124
0.85	0.85	0.85	0.6775	0.4591	5.1412
0.95	0.95	0.95	0.8910	0.7939	5.8077
1.00	1.00	1.00	0.9508	0.9040	6.2832
1.05	1.05	1.05	0.8872	0.7871	6.7574
1.15	1.15	1.15	0.6725	0.4522	7.4218
1.25	1.25	1.25	0.5979	0.3575	7.8540
1.35	1.35	1.35	0.6691	0.4477	8.2894
1.45	1.45	1.45	0.8719	0.7603	8.9553
1.50	1.50	1.50	0.9276	0.8605	9.4248
					0.0564
					0.0032
					3.1416
					4.1037
					3.5452
					0.4887
					0.5955
					0.7717
					0.7023
					0.3556
					0.0385
					0.3567
					0.7073
					0.5003
					0.1273
					0.0015
					3.1416
					2.1462
					2.7357
					3.1416
					3.5510
					3.1416
					0.6069
					0.5050
					0.1310
					0.0004
					3.1416
					4.1872
					3.5566
					3.1416
					0.6185
					0.5174
					0.1365
					2.0625

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.50}$	$\frac{ds}{.05}$	$\frac{T_n}{.9246}$	$\frac{T_n^2}{0.8549}$	$\frac{T_n}{0.4963}$	$\frac{R}{0.3810}$	$\frac{R^2}{0.1451}$	$\frac{R'}{2.0671}$
		0.05	0.9246	0.8549	0.4963	0.3810	0.1451	2.0671
		0.15	0.6799	0.4622	1.1597	0.7333	0.5378	2.7305
		0.25	0.6000	0.3600	1.5708	0.8000	0.6400	3.1416
		0.35	0.6799	0.4622	1.9819	0.7333	0.5378	3.5527
		0.45	0.9246	0.8549	2.6453	0.3810	0.1451	4.2161
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9246	0.8549	3.6379	0.3810	0.1451	2.0671
		0.65	0.6799	0.4622	4.3013	0.7333	0.5378	2.7305
		0.75	0.6000	0.3600	4.7124	0.8000	0.6400	3.1416
		0.85	0.6799	0.4622	5.1235	0.7333	0.5378	3.5527
		0.95	0.9246	0.8549	5.7869	0.3810	0.1451	4.2161
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9246	0.8549	6.7795	0.3810	0.1451	2.0671
		1.15	0.6799	0.4622	7.4429	0.7333	0.5378	2.7305
		1.25	0.6000	0.3600	7.8540	0.8000	0.6400	3.1416
		1.35	0.6799	0.4622	8.2651	0.7333	0.5378	3.5527
		1.45	0.9246	0.8549	8.9285	0.3810	0.1451	4.2161
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.005}$	$\frac{r}{.50}$	$\frac{d_s}{\lambda}$	$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$	$\frac{T_n}{T_n^2}$	$\frac{T_n}{.4960}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R}{.3805}$	$\frac{R^2}{.1448}$	$\frac{R'}{2.0692}$
		0.05	0.9235	0.8530	0.4960		0.3805	0.1448	2.0692
		0.15	0.6785	0.4605	1.1588		0.7320	0.5359	2.7313
		0.25	0.5986	0.3583	1.5708		0.7961	0.6370	3.1416
		0.35	0.6770	0.4583	1.9840		0.7303	0.5333	3.5508
		0.45	0.9153	0.8379	2.6484		0.3772	0.1423	4.1974
		0.50	0.9870	0.9743	3.1416		0.0103	0.0001	3.1416
		0.55	0.9133	0.8341	3.6341		0.3765	0.1417	2.0899
		0.65	0.6745	0.4550	4.2973		0.7276	0.5295	2.7340
		0.75	0.5957	0.3549	4.7124		0.7944	0.6310	3.1416
		0.85	0.6729	0.4527	5.1286		0.7259	0.5269	3.5481
		0.95	0.9052	0.8194	5.7934		0.3734	0.1394	4.1767
		1.00	0.9744	0.9494	6.2832		0.0204	0.0004	3.1416
		1.05	0.9032	0.8156	6.7723		0.3727	0.1389	2.1106
		1.15	0.6704	0.4494	7.4359		0.7233	0.5232	2.7367
		1.25	0.5929	0.3515	7.8540		0.7907	0.6252	3.1416
		1.35	0.6688	0.4472	8.2732		0.7216	0.5207	3.5454
		1.45	0.8953	0.8015	8.9383		0.3699	0.1368	4.1559
		1.50	0.9620	0.9254	9.4248		0.0302	0.0009	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n^3}{\lambda^3}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda^2}$	$\frac{R'}{\lambda}$
.010	.50	0.05	0.9225	0.8511	0.4956	0.3801	0.1445	2.0712
		0.15	0.6774	0.4588	1.1579	0.7307	0.5339	2.7321
		0.25	0.5972	0.3566	1.5708	0.7962	0.6340	3.1416
		0.35	0.6741	0.4544	1.9861	0.7272	0.5288	3.5490
		0.45	0.9062	0.8213	2.6515	0.3738	0.1397	4.1788
		0.50	0.9744	0.9494	3.1416	0.0204	0.0004	3.1416
		0.55	0.9022	0.8140	3.6304	0.3723	0.1386	2.1127
		0.65	0.6632	0.4478	4.2934	0.7221	0.5214	2.7575
		0.75	0.5915	0.3498	4.7124	0.7889	0.6223	3.1416
		0.85	0.5659	0.4434	5.1337	0.7187	0.5165	3.5435
		0.95	0.8864	0.7857	5.7966	0.3669	0.1346	4.1373
		1.00	0.9498	0.9021	6.2832	0.0398	0.0016	3.1416
		1.05	0.8825	0.7789	6.7654	0.3657	0.1337	2.1542
		1.15	0.6610	0.4369	7.4292	0.7137	0.5093	2.7430
		1.25	0.5857	0.3431	7.8540	0.7816	0.6109	3.1416
		1.35	0.6577	0.4325	8.2811	0.7104	0.5047	3.5379
		1.45	0.8672	0.7521	8.9476	0.3612	0.1305	4.0960
		1.50	0.9262	0.8578	9.4248	0.0582	0.0034	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$									
$\frac{P}{.000}$	$\frac{r}{.51}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9200}$	$\frac{T_n^2}{0.8464}$	$\frac{T_n}{0.5054}$	$\frac{R}{0.3919}$	$\frac{R^2}{0.1536}$	$\frac{R'}{2.0762}$	
		0.15	0.6676	0.4457	1.1676	0.7445	0.5543	2.7384	
		0.25	0.5872	0.3448	1.5708	0.8095	0.6552	3.1416	
		0.35	0.6676	0.4457	1.9740	0.7445	0.5543	3.5448	
		0.45	0.9200	0.8464	2.6362	0.3919	0.1536	4.2070	
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708	
		0.55	0.9200	0.8464	3.6470	0.3919	0.1536	2.0762	
		0.65	0.6676	0.4457	4.3092	0.7445	0.5543	2.7384	
		0.75	0.5872	0.3448	4.7124	0.8095	0.6552	3.1416	
		0.85	0.6676	0.4457	5.1156	0.7445	0.5543	3.5448	
		0.95	0.9200	0.8464	5.7778	0.3919	0.1536	4.2070	
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708	
		1.05	0.9200	0.8464	6.7886	0.3919	0.1536	2.0762	
		1.15	0.6676	0.4457	7.4507	0.7445	0.5543	2.7384	
		1.25	0.5872	0.3448	7.8540	0.8095	0.6552	3.1416	
		1.35	0.6676	0.4457	8.2572	0.7445	0.5543	3.5448	
		1.45	0.9200	0.8464	8.9194	0.3919	0.1536	4.2070	
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_3}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n^3}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R^3}{\lambda}$
0.010	0.51	0.05	0.9179	0.8426	0.5047	0.3910	0.1529	2.0803
		0.15	0.6652	0.4425	1.1657	0.7419	0.5504	2.7399
		0.25	0.5845	0.3416	1.5708	0.8057	0.6492	3.1416
		0.35	0.6620	0.4383	1.9784	0.7384	0.5452	3.5412
		0.45	0.9015	0.8127	2.6427	0.3844	0.1478	4.1700
		0.50	0.9738	0.9483	3.1416	0.0211	0.0004	3.1416
		0.55	0.8975	0.8055	3.6390	0.3829	0.1466	2.1214
		0.65	0.6572	0.4320	4.3011	0.7332	0.5376	2.7451
		0.75	0.5790	0.3352	4.7124	0.7984	0.6375	3.1416
		0.85	0.6541	0.4278	5.1262	0.7298	0.5327	3.5360
		0.95	0.8816	0.7772	5.7913	0.3773	0.1424	4.1280
		1.00	0.9488	0.9001	6.2832	0.0411	0.0017	3.1416
		1.05	0.8777	0.7703	6.7737	0.3760	0.1414	2.1625
		1.15	0.6493	0.4216	7.4366	0.7249	0.5254	2.7504
		1.25	0.5735	0.3289	7.8540	0.7912	0.6260	3.1416
		1.35	0.6461	0.4174	8.2738	0.7216	0.5207	3.5306
		1.45	0.8623	0.7435	8.9396	0.3713	0.1379	4.0880
		1.50	0.9247	0.8551	9.4248	0.0601	0.0036	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2 \theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$T_n$		$T_n^2$		$T_n$		$R$		$R^2$		$R'$	
$\frac{r}{.52}$	$\frac{ds}{.05}$	$\frac{P}{.000}$	$\frac{r}{.52}$	$\frac{ds}{.05}$	$\frac{P}{.000}$	$\frac{r}{.52}$	$\frac{ds}{.05}$	$\frac{P}{.000}$	$\frac{r}{.52}$	$\frac{ds}{.05}$	$\frac{P}{.000}$	$\frac{r}{.52}$	$\frac{ds}{.05}$	$\frac{P}{.000}$	$\frac{r}{.52}$
	0.05			0.9152	0.8375		0.5149	0.4031		0.1625	2.0857				
	0.15			0.6551	0.4292		1.1755	0.7555		0.5708	2.7463				
	0.25			0.5743	0.3298		1.5708	0.8186		0.6702	3.1416				
	0.35			0.6551	0.4292		1.9661	0.7555		0.5708	3.5369				
	0.45			0.9152	0.8375		2.6267	0.4031		0.1625	4.1975				
	0.50			1.0000	1.0000		3.1416	0.0000		0.0000	1.5708				
	0.55			0.9152	0.8375		3.6565	0.4031		0.1625	2.0857				
	0.65			0.6551	0.4292		4.3171	0.7555		0.5708	2.7463				
	0.75			0.5743	0.3298		4.7124	0.8186		0.6702	3.1416				
	0.85			0.6551	0.4292		5.1077	0.7555		0.5708	3.5369				
	0.95			0.9152	0.8375		5.7683	0.4031		0.1625	4.1975				
	1.00			1.0000	1.0000		6.2832	0.0000		0.0000	1.5708				
	1.05			0.9152	0.8375		6.7980	0.4031		0.1625	2.0857				
	1.15			0.6551	0.4292		7.4587	0.7555		0.5708	2.7463				
	1.25			0.5743	0.3298		7.8540	0.8186		0.6702	3.1416				
	1.35			0.6551	0.4292		8.2493	0.7555		0.5708	3.5369				
	1.45			0.9152	0.8375		8.9099	0.4031		0.1625	4.1975				
	1.50			1.0000	1.0000		9.4248	0.0000		0.0000	1.5708				

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52105

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$P = \frac{4 \tan \theta}{4 - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{F}{.52}$	$\frac{ds}{.05}$	$\frac{T_n}{.9141}$	$\frac{T_n^2}{0.8356}$	$\frac{T_n}{0.5145}$	$\frac{R}{0.4027}$	$\frac{R^2}{0.1621}$	$\frac{R'}{2.0877}$
		0.05	0.9141	0.8356	0.5145	0.4027	0.1621	2.0877
		0.15	0.6540	0.4277	1.1745	0.7542	0.5688	2.7470
		0.25	0.5730	0.3283	1.5708	0.8168	0.6672	3.1416
		0.35	0.6524	0.4257	1.9684	0.7524	0.5661	3.5352
		0.45	0.9058	0.8204	2.6302	0.3941	0.1543	4.1793
		0.50	0.9865	0.9731	3.1416	0.0110	0.0001	3.1416
		0.55	0.9037	0.8167	3.6522	0.3982	0.1586	2.1080
		0.65	0.6501	0.4227	4.3123	0.7498	0.5622	2.7495
		0.75	0.5704	0.3254	4.7124	0.8131	0.6612	3.1416
		0.85	0.6486	0.4207	5.1132	0.7481	0.5596	3.5327
		0.95	0.6055	0.3620	5.7756	0.3944	0.1560	4.1589
		1.00	0.9733	0.9472	6.2832	0.0218	0.0005	3.1416
		1.05	0.8935	0.7984	6.7900	0.3941	0.1553	2.1283
		1.15	0.6463	0.4177	7.4513	0.7455	0.5558	2.7520
		1.25	0.5673	0.3224	7.8540	0.8095	0.6553	3.1416
		1.35	0.6448	0.4157	8.2579	0.7438	0.5532	3.5301
		1.45	0.8855	0.7840	8.9209	0.3911	0.1529	4.1386
		1.50	0.9603	0.9222	9.4248	0.0323	0.0010	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_g = \frac{\pi V}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.52}$	$\frac{d_s}{.05}$	$T_n$	$T_n^2$	$T_n'$	$R$	$R^2$	$R'$
		0.05	0.9131	0.8337	0.5141	0.4022	0.1618	2.0897
		0.15	0.6528	0.4262	1.1736	0.7529	0.5668	2.7478
		0.25	0.5717	0.3269	1.5708	0.8150	0.6642	3.1416
		0.35	0.6498	0.4222	1.9706	0.7494	0.5616	3.5334
		0.45	0.8966	0.8038	2.6337	0.3953	0.1563	4.1610
		0.50	0.9733	0.9472	3.1416	0.0218	0.0005	3.1416
		0.55	0.8925	0.7965	3.6480	0.3937	0.1550	2.1304
		0.65	0.6451	0.4162	4.3088	0.7442	0.5538	2.7528
		0.75	0.5665	0.3209	4.7124	0.8077	0.6524	3.1416
		0.85	0.6421	0.4122	5.1185	0.7408	0.5488	3.5283
		0.95	0.8765	0.7683	5.7826	0.3879	0.1505	4.1203
		1.00	0.9477	0.8981	6.2832	0.0424	0.0018	3.1416
		1.05	0.8726	0.7614	6.7823	0.3865	0.1494	2.1711
		1.15	0.6374	0.4063	7.4441	0.7358	0.5414	2.7579
		1.25	0.5612	0.3150	7.8540	0.8006	0.6409	3.1416
		1.35	0.6344	0.4024	8.2663	0.7326	0.5366	3.5231
		1.45	0.8571	0.7346	8.9313	0.3816	0.1456	4.0797
		1.50	0.9232	0.8523	9.4248	0.0620	0.0038	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.53}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9100}$	$\frac{T_n^2}{.8282}$	$\frac{T_n}{.9100}$	$\frac{T_n^2}{.8282}$	$\frac{T_n}{.9100}$	$\frac{R}{.4145}$	$\frac{R^2}{.1718}$	$\frac{R'}{2.0955}$
		0.05	0.9100	0.8282	0.9100	0.8282	0.5247	0.4145	0.1718	2.0955
		0.15	0.6425	0.4129	0.6425	0.4129	1.1835	0.7663	0.5871	2.7543
		0.25	0.5514	0.3152	0.5514	0.3152	1.5708	0.8275	0.6848	3.1416
		0.35	0.6425	0.4129	0.6425	0.4129	1.9581	0.7663	0.5871	3.5289
		0.45	0.9100	0.8282	0.9100	0.8282	2.6169	0.4145	0.1718	4.1877
		0.50	1.0000	1.0000	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9100	0.8282	0.9100	0.8282	3.6663	0.4145	0.1718	2.0955
		0.65	0.6425	0.4129	0.6425	0.4129	4.3251	0.7663	0.5871	2.7543
		0.75	0.5514	0.3152	0.5514	0.3152	4.7124	0.8275	0.6848	3.1416
		0.85	0.6425	0.4129	0.6425	0.4129	5.0997	0.7663	0.5871	3.5289
		0.95	0.9100	0.8282	0.9100	0.8282	5.7585	0.4145	0.1718	4.1877
		1.00	1.0000	1.0000	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9100	0.8282	0.9100	0.8282	6.8078	0.4145	0.1718	2.0955
		1.15	0.6425	0.4129	0.6425	0.4129	7.4667	0.7663	0.5871	2.7543
		1.25	0.5514	0.3152	0.5514	0.3152	7.8540	0.8275	0.6848	3.1416
		1.35	0.6425	0.4129	0.6425	0.4129	8.2413	0.7663	0.5871	3.5289
		1.45	0.9100	0.8282	0.9100	0.8282	8.9001	0.4145	0.1718	4.1877
		1.50	1.0000	1.0000	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.005}$		$\frac{r}{.53}$	$\frac{ds}{.05}$	$\frac{T_n}{.9090}$	$\frac{T_n^2}{.8262}$	$\frac{T_n'}{.5242}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$\frac{R}{.4141}$	$\frac{R^2}{.1714}$	$\frac{R'}{2.0975}$
			0.05	0.9090	0.8262	0.5242			0.4141	0.1714	2.0975
			0.15	0.6414	0.4114	1.1825			0.7649	0.5851	2.7550
			0.25	0.5602	0.3138	1.5708			0.8257	0.6818	3.1416
			0.35	0.6399	0.4095	1.9604			0.7632	0.5824	3.5272
			0.45	0.9006	0.8111	2.6206			0.4103	0.1684	4.1697
			0.50	0.9862	0.9725	3.1416			0.0114	0.0001	3.1416
			0.55	0.8985	0.8074	3.6617			0.4095	0.1677	2.1175
			0.65	0.6377	0.4057	4.3208			0.7606	0.5784	2.7574
			0.75	0.5577	0.3110	4.7124			0.8221	0.6750	3.1416
			0.85	0.6362	0.4048	5.1053			0.7588	0.5758	3.5248
			0.95	0.8903	0.7927	5.7662			0.4060	0.1649	4.1496
			1.00	0.9727	0.9461	6.2832			0.0225	0.0005	3.1416
			1.05	0.8883	0.7890	6.7993			0.4052	0.1642	2.1377
			1.15	0.6340	0.4019	7.4591			0.7563	0.5719	2.7598
			1.25	0.5552	0.3082	7.8540			0.8185	0.6700	3.1416
			1.35	0.6325	0.4001	8.2502			0.7545	0.5693	3.5224
			1.45	0.8802	0.7747	8.9118			0.4020	0.1616	4.1294
			1.50	0.9595	0.9206	9.4248			0.0333	0.0011	3.1416

REPORT NO. NADC-EL-52195

$$p = \frac{e \tan \theta}{e - \sin 2\theta}$$

$$ds = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.53}$	$\frac{ds}{.05}$	$\frac{T_n}{.9079}$	$\frac{T_n^2}{0.8243}$	$\frac{T'_n}{0.5238}$	$\frac{R}{0.4136}$	$\frac{R^2}{0.1710}$	$\frac{R'}{2.0995}$
		0.15	0.6403	0.4100	1.1815	0.7636	0.5831	2.7557
		0.25	0.5589	0.3124	1.5708	0.8239	0.6788	3.1416
		0.35	0.6373	0.4062	1.9627	0.7601	0.5778	3.5255
		0.45	0.8913	0.7945	2.6243	0.4064	0.1652	4.1516
		0.50	0.9727	0.9461	3.1416	0.0225	0.0005	3.1416
		0.55	0.8873	0.7872	3.6573	0.4048	0.1638	2.1397
		0.65	0.6329	0.4005	4.3165	0.7550	0.5700	2.7606
		0.75	0.5539	0.3068	4.7124	0.8167	0.6671	3.1416
		0.85	0.6299	0.3968	5.1108	0.7516	0.5649	3.5207
		0.95	0.8712	0.7590	5.7736	0.3987	0.1589	4.1113
		1.00	0.9466	0.8960	6.2832	0.0438	0.0019	3.1416
		1.05	0.8672	0.7521	6.7912	0.3973	0.1578	2.1800
		1.15	0.6254	0.3912	7.4517	0.7466	0.5574	2.7655
		1.25	0.5489	0.3013	7.8540	0.8097	0.6556	3.1416
		1.35	0.6225	0.3875	8.2588	0.7433	0.5525	3.5156
		1.45	0.8517	0.7253	8.9227	0.3921	0.1538	4.0711
		1.50	0.9216	0.8493	9.4248	0.0640	0.0041	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

P	r	$\frac{ds}{r}$	$T_n$	$T_n^2$	$\frac{T_n}{T_n^2}$	R	$R^2$	$R'$
0.00	0.54	0.05	0.9046	0.8184	0.5348	0.4262	0.1816	2.1056
		0.15	0.6298	0.3966	1.1916	0.7768	0.6034	2.7624
		0.25	0.5485	0.3008	1.5708	0.8362	0.6992	3.1416
		0.35	0.6298	0.3966	1.9500	0.7768	0.6034	3.5208
		0.45	0.9046	0.8184	2.6068	0.4262	0.1816	4.1776
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.9046	0.8184	3.6764	0.4262	0.1816	2.1056
		0.65	0.6298	0.3966	4.3332	0.7768	0.6034	2.7624
		0.75	0.5485	0.3008	4.7124	0.8362	0.6992	3.1416
		0.85	0.6298	0.3966	5.0916	0.7768	0.6034	3.5208
		0.95	0.9046	0.8184	5.7484	0.4262	0.1816	4.1776
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.9046	0.8184	6.8180	0.4262	0.1816	2.1056
		1.15	0.6298	0.3966	7.4748	0.7768	0.6034	2.7624
		1.25	0.5485	0.3008	7.8540	0.8362	0.6992	3.1416
		1.35	0.6298	0.3966	8.2332	0.7768	0.6034	3.5208
		1.45	0.9046	0.8184	8.8900	0.4262	0.1816	4.1776
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.54}$	$\frac{d_s}{.05}$	$\frac{T_n}{.9036}$	$\frac{T_n^2}{0.8164}$	$\frac{T_n''}{0.5344}$	$\frac{R}{0.4257}$	$\frac{R^2}{0.1812}$	$\frac{R'}{2.1076}$
		0.05	0.9036	0.8164	0.5344	0.4257	0.1812	2.1076
		0.15	0.6287	0.3953	1.1906	0.7755	0.6013	2.7631
		0.25	0.5473	0.2995	1.5708	0.8344	0.6962	3.1416
		0.35	0.6273	0.3935	1.9524	0.7737	0.5986	3.5192
		0.45	0.8952	0.8013	2.6107	0.4218	0.1779	4.1597
		0.50	0.9859	0.9719	3.1416	0.0118	0.0001	3.1416
		0.55	0.8931	0.7976	3.6716	0.4209	0.1772	2.1274
		0.65	0.6251	0.3908	4.3287	0.7711	0.5946	2.7654
		0.75	0.5449	0.2969	4.7124	0.3308	0.6902	3.1416
		0.85	0.6237	0.3890	5.0974	0.7694	0.5919	3.5169
		0.95	0.8848	0.7829	5.7565	0.4173	0.1742	4.1398
		1.00	0.9720	0.9449	6.2832	0.0233	0.0005	3.1416
		1.05	0.8828	0.7793	6.8090	0.4165	0.1734	2.1473
		1.15	0.6215	0.3853	7.4670	0.7668	0.5880	2.7677
		1.25	0.5425	0.2943	7.8540	0.8273	0.6844	3.1416
		1.35	0.6201	0.3845	8.2423	0.7651	0.5854	3.5145
		1.45	0.8746	0.7649	8.9023	0.4132	0.1707	4.1199
		1.50	0.9586	0.9188	9.4248	0.0344	0.0012	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.010}$	$\frac{r}{.54}$	$\frac{d_s}{\lambda}$	$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n''}{T_n}$	$P = \frac{\epsilon \tan^2 \theta}{\epsilon - \sin^2 \theta}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
0.05		0.05	0.9025	0.8145	0.5339	0.4252	0.1808	0.7741	0.5993	2.1096
0.15		0.15	0.6276	0.3939	1.1895	0.8326	0.5932	0.7741	0.5993	2.7638
0.25		0.25	0.5461	0.2982	1.5708	0.8326	0.6932	0.8326	0.6932	3.1416
0.35		0.35	0.6248	0.3903	1.9548	0.7707	0.5939	0.7707	0.5939	3.5176
0.45		0.45	0.8858	0.7847	2.6145	0.4178	0.1745	0.4178	0.1745	4.1418
0.50		0.50	0.9720	0.9449	3.1416	0.0233	0.0005	0.0233	0.0005	3.1416
0.55		0.55	0.8817	0.7774	3.6670	0.4160	0.1731	0.4160	0.1731	2.1493
0.65		0.65	0.6205	0.3850	4.3244	0.7655	0.5860	0.7655	0.5860	2.7684
0.75		0.75	0.5413	0.2930	4.7124	0.8255	0.6815	0.8255	0.6815	3.1416
0.85		0.85	0.6176	0.3814	5.1031	0.7622	0.5809	0.7622	0.5809	3.5179
0.95		0.95	0.8556	0.7492	5.7643	0.4097	0.1678	0.4097	0.1678	4.1020
1.00		1.00	0.9454	0.8937	6.2832	0.0453	0.0021	0.0453	0.0021	3.1416
1.05		1.05	0.8616	0.7474	6.8004	0.4082	0.1666	0.4082	0.1666	2.1892
1.15		1.15	0.6133	0.3761	7.4594	0.7572	0.5733	0.7572	0.5733	2.7732
1.25		1.25	0.5365	0.2878	7.8540	0.8186	0.6700	0.8186	0.6700	3.1416
1.35		1.35	0.6104	0.3726	8.2512	0.7539	0.5684	0.7539	0.5684	3.5080
1.45		1.45	0.8460	0.7157	8.9138	0.4029	0.1623	0.4029	0.1623	4.0622
1.50		1.50	0.9109	0.8462	9.4248	0.0561	0.0044	0.0561	0.0044	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{r \tan \theta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.55}$	$\frac{ds}{.05}$	$\frac{T_n}{.8989}$	$\frac{T_n^2}{.8081}$	$\frac{T_n}{.5454}$	$\frac{R}{.4381}$	$\frac{R^2}{.1919}$	$\frac{R'}{2.1162}$
		0.05	0.8989	0.8081	0.5454	0.4381	0.1919	2.1162
		0.15	0.6169	0.3805	1.1997	0.7871	0.6195	2.7705
		0.25	0.5355	0.2868	1.5708	0.8445	0.7132	3.1416
		0.35	0.6169	0.3805	1.9418	0.7871	0.6195	3.5126
		0.45	0.8989	0.8081	2.5962	0.4381	0.1919	4.1670
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8989	0.8081	3.6870	0.4381	0.1919	2.1162
		0.65	0.6169	0.3805	4.2413	0.7871	0.6195	2.7705
		0.75	0.5355	0.2868	4.7124	0.8445	0.7132	3.1416
		0.85	0.6169	0.3805	5.0834	0.7871	0.6195	3.5126
		0.95	0.8989	0.8081	5.7378	0.4381	0.1919	4.1670
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8989	0.8081	6.8286	0.4381	0.1919	2.1162
		1.15	0.6169	0.3805	7.4829	0.7871	0.6195	2.7705
		1.25	0.5355	0.2868	7.8540	0.8445	0.7132	3.1416
		1.35	0.6169	0.3805	8.2250	0.7871	0.6195	3.5126
		1.45	0.8989	0.8081	8.8794	0.4381	0.1919	4.1670
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$									
$\frac{P}{.005}$	$\frac{r}{.55}$	$\frac{ds}{.05}$	$\frac{T_n}{.0879}$	$\frac{T_n^2}{.08052}$	$\frac{T_n}{.5449}$	$\frac{R}{.4376}$	$\frac{R^2}{.1915}$	$\frac{R'}{2.1181}$	
		0.15	0.6158	0.3733	1.1987	0.7857	0.6174	2.7712	
		0.25	0.5344	0.2856	1.5708	0.8428	0.7102	3.1416	
		0.35	0.6145	0.3776	1.9443	0.7840	0.6147	3.5111	
		0.45	0.8894	0.7911	2.6004	0.4336	0.1880	4.1494	
		0.50	0.9855	0.9712	3.1416	0.0122	0.0001	3.1416	
		0.55	0.8873	0.7873	3.6819	0.4326	0.1871	2.1377	
		0.65	0.6124	0.3750	4.3368	0.7814	0.6106	2.7734	
		0.75	0.5321	0.2831	4.7124	0.8392	0.7043	3.1416	
		0.85	0.6110	0.3733	5.0894	0.7797	0.6079	3.5089	
		0.95	0.8790	0.7727	5.7464	0.4289	0.1839	4.1297	
		1.00	0.9714	0.9436	6.2832	0.0241	0.0006	3.1416	
		1.05	0.8769	0.7690	6.8190	0.4280	0.1832	2.1574	
		1.15	0.6089	0.3708	7.4749	0.7771	0.6039	2.7756	
		1.25	0.5298	0.2807	7.8540	0.8357	0.6985	3.1416	
		1.35	0.6076	0.3691	8.2344	0.7754	0.6013	3.5066	
		1.45	0.8688	0.7548	8.8324	0.4245	0.1802	4.1101	
		1.50	0.9576	0.9170	9.4248	0.0356	0.0013	3.1416	

**REPORT NO. NADC-EL-52195**

$\frac{p}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{r}$	$\frac{T_n^2}{r}$	$\frac{T_n^3}{r}$	$\frac{R}{r}$	$\frac{R^2}{r}$	$\frac{R'}{r}$
0.010	0.05	0.8968	0.8043	0.5444	0.4371	0.1910	2.1201
	0.15	0.6148	0.3780	1.11976	0.7844	0.6153	2.7719
	0.25	0.5232	0.2844	1.5708	0.8410	0.7073	3.1416
	0.35	0.6121	0.3746	1.9468	0.7810	0.6099	3.5096
	0.45	0.8800	0.7745	2.6044	0.4293	0.1843	4.1317
	0.50	0.9714	0.9436	3.1416	0.0241	0.0006	3.1416
	0.55	0.8759	0.7672	3.6770	0.4275	0.1828	2.1592
	0.65	0.6079	0.3695	4.3323	0.7759	0.6020	2.7753
	0.75	0.5287	0.2795	4.7124	0.8340	0.6956	3.1416
	0.85	0.6051	0.3662	5.0952	0.7725	0.5967	3.5050
	0.95	0.8597	0.7391	5.7547	0.4209	0.1772	4.0923
	1.00	0.9441	0.8914	6.2832	0.0468	0.0022	3.1416
	1.05	0.8557	0.7322	6.8100	0.4194	0.1759	2.1988
	1.15	0.6010	0.3612	7.4671	0.7675	0.5891	2.7809
	1.25	0.5241	0.2747	7.8540	0.8271	0.6842	3.1416
	1.35	0.5982	0.3578	8.2435	0.7643	0.5841	3.5004
	1.45	0.8400	0.7056	8.9046	0.4138	0.1712	4.0530
	1.50	0.9182	0.8430	9.4248	0.0683	0.0047	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$p = \frac{4 \tan \theta}{4 - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub> '	R	R <sup>2</sup>	R'
0.00	0.56	0.05	0.6038	0.3646	0.5563	0.4502	0.2027	2.1271
		0.15	0.6038	0.3646	1.2080	0.7971	0.6354	2.7788
		0.25	0.5225	0.2730	1.5708	0.8526	0.7270	3.1416
		0.35	0.6038	0.3646	1.9336	0.7971	0.6354	3.5044
		0.45	0.8029	0.7973	2.5853	0.4502	0.2027	4.1561
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8929	0.7973	3.6979	0.4502	0.2027	2.1271
		0.65	0.6038	0.3646	4.3495	0.7971	0.6354	2.7788
		0.75	0.5225	0.2730	4.7124	0.8526	0.7270	3.1416
		0.85	0.6038	0.3646	5.0752	0.7971	0.6354	3.5044
		0.85	0.8929	0.7973	5.7269	0.4502	0.2027	4.1561
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8929	0.7973	6.8395	0.4502	0.2027	2.1271
		1.15	0.6038	0.3646	7.4911	0.7971	0.6354	2.7788
		1.25	0.5225	0.2730	7.8540	0.8526	0.7270	3.1416
		1.35	0.6038	0.3646	8.2168	0.7971	0.6354	3.5044
		1.45	0.8029	0.7973	8.8685	0.4502	0.2027	4.1561
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{e - \sin^2\theta}}{\lambda}$$

$$p = \frac{e \tan \theta}{e - \sin^2\theta}$$

$\frac{p}{-}$	$\frac{r}{-}$	$\frac{d_g}{-}$	$\frac{T_n}{-}$	$\frac{T_n''}{-}$	$\frac{T_n''}{-}$	$\frac{R}{-}$	$\frac{R^2}{-}$	$\frac{R'}{-}$
.005	.55	0.05	0.8918	0.7954	0.5558	0.4497	0.2022	2.1290
		0.15	0.6028	0.3634	1.2069	0.7958	0.6333	2.7794
		0.25	0.5215	0.2719	1.5708	0.8509	0.7240	3.1416
		0.35	0.6015	0.3618	1.9362	0.7941	0.6305	3.5030
		0.45	0.8834	0.7803	2.5896	0.4455	0.1985	4.1387
		0.50	0.9852	0.9705	3.1416	0.0126	0.0002	3.1416
		0.55	0.8813	0.7766	3.6026	0.4445	0.1976	2.1484
		0.65	0.5995	0.3594	4.3449	0.7915	0.6264	2.7815
		0.75	0.5193	0.2697	4.7124	0.8474	0.7181	3.1416
		0.85	0.5982	0.3578	5.0813	0.7898	0.6237	3.5008
		0.95	0.8729	0.7620	5.7360	0.4407	0.1942	4.1193
		1.00	0.9707	0.9423	6.2832	0.0249	0.0006	3.1416
		1.05	0.8708	0.7584	6.8295	0.4397	0.1934	2.1678
		1.15	0.5962	0.3555	7.4829	0.7872	0.6197	2.7836
		1.25	0.5171	0.2674	7.8540	0.8440	0.7123	3.1416
		1.35	0.5949	0.3539	8.2265	0.7855	0.6171	3.4987
		1.45	0.8626	0.7441	8.8822	0.4361	0.1902	4.0998
		1.50	0.9566	0.9151	9.4248	0.0268	0.0014	3.1416

**REPORT NO. NADC-EL-52195**

$\frac{P}{r}$	$\frac{r}{.56}$	$\frac{ds}{\lambda}$	$\frac{ds}{\lambda} = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$	$\frac{T_n}{0.8908}$	$\frac{T_n^2}{0.7935}$	$\frac{T_n}{0.5553}$	$\frac{R}{0.4492}$	$\frac{R^2}{0.2017}$	$\frac{R'}{2.1310}$
0.15	0.15	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.25	0.25	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.35	0.35	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.45	0.45	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.50	0.50	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.55	0.55	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.65	0.65	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.75	0.75	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.85	0.85	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
0.95	0.95	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
1.00	1.00	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
1.05	1.05	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
1.15	1.15	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
1.25	1.25	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
1.35	1.35	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
1.45	1.45	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310
1.50	1.50	0.05	0.6018	0.7935	0.5553	0.4492	0.2017	2.7800	2.1310

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.57}$	$\frac{ds}{.05}$	$\frac{T_n}{.8866}$	$\frac{T_n^2}{.7860}$	$\frac{T_n'}{.5677}$	$\frac{R}{.4626}$	$\frac{R^2}{.2140}$	$\frac{R'}{2.1384}$
		0.05	0.8866	0.7860	0.5677	0.4626	0.2140	2.1384
		0.15	0.5907	0.3489	1.2162	0.8069	0.6511	2.7870
		0.25	0.5095	0.2596	1.5708	0.8604	0.7404	3.1416
		0.35	0.5907	0.3489	1.9254	0.8069	0.6511	3.4962
		0.45	0.8866	0.7860	2.5739	0.4626	0.2140	4.1447
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8866	0.7860	3.7092	0.4626	0.2140	2.1384
		0.65	0.5907	0.3489	4.3578	0.8069	0.6511	2.7870
		0.75	0.5095	0.2596	4.7124	0.8604	0.7404	3.1416
		0.85	0.5907	0.3489	5.0670	0.8069	0.6511	3.4962
		0.95	0.8866	0.7860	5.7155	0.4626	0.2140	4.1447
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8866	0.7860	6.8508	0.4626	0.2140	2.1384
		1.15	0.5907	0.3489	7.4994	0.8069	0.6511	2.7870
		1.25	0.5095	0.2596	7.8540	0.8604	0.7404	3.1416
		1.35	0.5907	0.3489	8.2085	0.8069	0.6511	3.4962
		1.45	0.8866	0.7860	8.8571	0.4626	0.2140	4.1447
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$									
$\frac{p}{.005}$	$\frac{r}{.57}$	$\frac{ds}{.05}$	$\frac{T_n}{.8855}$	$\frac{T_n^2}{.7841}$	$\frac{T_n}{.5671}$	$\frac{R}{.4621}$	$\frac{R^2}{.2135}$	$\frac{R'}{2.1404}$	
		0.05	0.8855	0.7841	0.5671	0.4621	0.2135	2.1404	
		0.15	0.5897	0.3478	1.2151	0.8056	0.6490	2.7876	
		0.25	0.5085	0.2586	1.5708	0.3587	0.7374	3.1416	
		0.35	0.5884	0.3463	1.9280	0.8039	0.6463	3.4942	
		0.45	0.8770	0.7691	2.5785	0.4577	0.2095	4.1276	
		0.50	0.9848	0.9698	3.1416	0.0131	0.0002	3.1416	
		0.55	0.8749	0.7654	3.7036	0.4567	0.2086	2.1594	
		0.65	0.5865	0.3440	4.3530	0.8013	0.6421	2.7897	
		0.75	0.5065	0.2565	4.7124	0.8553	0.7316	3.1416	
		0.85	0.5852	0.3425	5.0732	0.7946	0.6394	3.4927	
		0.95	0.8665	0.7508	5.7251	0.4527	0.2049	4.1085	
		1.00	0.9700	0.9409	6.2832	0.0257	0.0007	3.1416	
		1.05	0.8644	0.7472	6.8402	0.4517	0.2040	2.1786	
		1.15	0.5833	0.3403	7.4910	0.7971	0.6354	2.7917	
		1.25	0.5044	0.2544	7.8540	0.8519	0.7258	3.1416	
		1.35	0.5820	0.3388	8.2184	0.7954	0.6327	3.4906	
		1.45	0.8562	0.7330	8.8716	0.4480	0.2007	4.0893	
		1.50	0.9555	0.9131	9.4248	0.0380	0.0014	3.1416	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.010}$	$\frac{r}{.57}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8844}$	$\frac{T_n^2}{.7822}$	$\frac{T_n}{1.2140}$	$\frac{R}{.4615}$	$\frac{R^2}{.2130}$	$\frac{R'}{2.1423}$
		.15	.5888	.3466	1.2140	.8043	.6469	2.7882
		.25	.5075	.2576	1.5708	.8570	.7345	3.1416
		.35	.5862	.3436	1.9305	.8009	.6415	3.4933
		.45	.8675	.7526	2.5831	.4532	.2054	4.1104
		.50	.9700	.9409	3.1416	.00257	.0007	3.1416
		.55	.8634	.7454	3.5982	.4512	.2036	2.1205
		.65	.5824	.3392	4.3483	.7958	.6334	2.7923
		.75	.5034	.2534	4.7124	.8502	.7229	3.1416
		.85	.5798	.3362	5.0794	.7925	.6281	3.4892
		.95	.8470	.7174	5.7343	.4440	.1972	4.0720
		1.00	.9415	.8864	6.2832	.0500	.0025	3.1416
		1.05	.8430	.7107	6.8302	.4424	.1957	2.2189
		1.15	.5760	.3317	7.4827	.7876	.6203	2.7966
		1.25	.4992	.2492	7.8540	.8436	.7116	3.1416
		1.35	.5734	.3288	8.2280	.7844	.6153	3.4849
		1.45	.8272	.6843	8.8851	.4363	.1904	4.0336
		1.50	.9144	.8361	9.4248	.0728	.0053	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{p}{.000}$	$\frac{r}{.58}$	$\frac{ds}{.05}$	$\frac{T_n}{.8798}$	$\frac{T_n^2}{.7741}$	$\frac{T_n}{.5794}$	$\frac{R}{.4753}$	$\frac{R^2}{.2259}$	$\frac{R'}{2.1502}$
		0.05	0.8798	0.7741	0.5794	0.4753	0.2259	2.1502
		0.10	0.5774	0.3333	1.2246	0.8165	0.6667	2.7954
		0.25	0.4966	0.2466	1.5708	0.8680	0.7534	3.1416
		0.35	0.5774	0.3333	1.0170	0.8165	0.6667	3.4878
		0.45	0.8798	0.7741	2.5622	0.4753	0.2259	4.1330
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8798	0.7741	3.7210	0.4753	0.2259	2.1502
		0.65	0.5774	0.3333	4.3662	0.8165	0.6667	2.7954
		0.75	0.4966	0.2466	4.7124	0.8680	0.7534	3.1416
		0.85	0.5774	0.3333	5.0586	0.8165	0.6667	3.4878
		0.95	0.8798	0.7741	5.7038	0.4753	0.2259	4.1330
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8798	0.7741	6.8626	0.4753	0.2259	2.1502
		1.15	0.5774	0.3333	7.5077	0.8165	0.6667	2.7954
		1.25	0.4966	0.2466	7.8540	0.8680	0.7534	3.1416
		1.35	0.5774	0.3333	8.2002	0.8165	0.6667	3.4878
		1.45	0.8798	0.7741	8.8454	0.4753	0.2259	4.1330
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

REPORT NO. NADC-EL-52195

176

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.56}$	$\frac{ds}{.05}$	$\frac{T_n}{.8777}$	$\frac{T_n^2}{.7703}$	$\frac{T_n}{.5783}$	$\frac{R}{.4741}$	$\frac{R^2}{.2248}$	$\frac{R'}{2.1540}$
		0.15	0.5755	0.3312	1.2223	0.8139	0.6625	2.7965
		0.25	0.4946	0.2446	1.5708	0.5646	0.7476	3.1416
		0.35	0.5731	0.3284	1.9223	0.8105	0.6570	3.4851
		0.45	0.8607	0.7409	2.5718	0.4654	0.2166	4.0991
		0.50	0.9692	0.9394	3.1416	0.0266	0.0007	3.1416
		0.55	0.8566	0.7337	3.7093	0.4634	0.2148	2.1916
		0.65	0.5694	0.3242	4.3564	0.8055	0.6488	2.8004
		0.75	0.4907	0.2408	4.7124	0.8580	0.7361	3.1416
		0.85	0.5669	0.3214	5.0713	0.8022	0.6435	3.4811
		0.95	0.8402	0.7059	5.7236	0.4560	0.2079	4.0612
		1.00	0.9401	0.8837	5.7832	0.0516	0.0027	3.1416
		1.05	0.8362	0.6992	6.8408	0.4542	0.2063	2.2296
		1.15	0.5632	0.3172	7.4907	0.7973	0.6357	2.8045
		1.25	0.4867	0.2369	7.8540	0.8514	0.7249	3.1416
		1.35	0.5608	0.3145	8.2202	0.7941	0.6306	3.4770
		1.45	0.8203	0.6729	8.8749	0.4479	0.2006	4.0233
		1.50	0.9124	0.8324	9.4248	0.0752	0.0057	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.000}$	$\frac{r}{.59}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8727}$	$\frac{T_n^2}{.7617}$	$\frac{T_n}{.5916}$	$\frac{R}{.4882}$	$\frac{R^2}{.2383}$	$\frac{R'}{2.1624}$
		0.05	0.8727	0.7617	0.5916	0.4882	0.2383	2.1624
		0.15	0.5639	0.3180	1.2329	0.8258	0.6820	2.8037
		0.25	0.4836	0.2338	1.5708	0.8753	0.7662	3.1416
		0.35	0.5639	0.3180	1.9087	0.8258	0.6820	3.4795
		0.45	0.8727	0.7617	2.5500	0.4882	0.2383	4.1208
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8727	0.7617	3.7332	0.4882	0.2383	2.1624
		0.65	0.5639	0.3180	4.3745	0.8258	0.6820	2.8037
		0.75	0.4836	0.2338	4.7124	0.8753	0.7662	3.1416
		0.85	0.5639	0.3180	5.0503	0.8258	0.6820	3.4795
		0.95	0.8727	0.7617	5.6916	0.4882	0.2383	4.1208
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8727	0.7617	6.8748	0.4882	0.2383	2.1624
		1.15	0.5639	0.3180	7.5161	0.8258	0.6820	2.8037
		1.25	0.4836	0.2338	7.8540	0.8753	0.7662	3.1416
		1.35	0.5639	0.3180	8.1919	0.8258	0.6820	3.4795
		1.45	0.8727	0.7617	8.8331	0.4882	0.2383	4.1208
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{.005}$	$\frac{r}{.59}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8717}$	$\frac{T_n^2}{.7598}$	$\frac{T_n'}{.5911}$	$\frac{R}{.4876}$	$\frac{R^2}{.2377}$	$\frac{R'}{2.1643}$
		0.15	0.5631	0.3170	1.42518	0.8245	0.6799	2.8043
		0.25	0.4826	0.2330	1.5708	0.8736	0.7633	3.1416
		0.35	0.5619	0.3157	1.9114	0.8228	0.6771	3.4782
		0.45	0.8631	0.7450	2.5551	0.4829	0.2332	4.1041
		0.50	0.9840	0.9682	3.1416	0.0140	0.0002	3.1416
		0.55	0.8610	0.7413	3.7270	0.4818	0.2321	2.1828
		0.65	0.5601	0.3138	4.3695	0.8203	0.6729	2.8061
		0.75	0.4808	0.2312	4.7124	0.8703	0.7575	3.1416
		0.85	0.5590	0.3124	5.0568	0.8187	0.6702	3.4763
		0.95	0.8526	0.7269	5.7022	0.4774	0.2279	4.0856
		1.00	0.9684	0.9378	6.2832	0.0275	0.0008	3.1416
		1.05	0.8505	0.7233	6.8630	0.4764	0.2269	2.2014
		1.15	0.5572	0.3105	7.5073	0.8162	0.6661	2.8080
		1.25	0.4789	0.2294	7.8540	0.8671	0.7518	3.1416
		1.35	0.5560	0.3092	8.2022	0.8145	0.6634	3.4744
		1.45	0.8422	0.7093	8.8493	0.4724	0.2231	4.0669
		1.50	0.9533	0.9087	9.4248	0.0407	0.0017	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.50}$	$\frac{ds}{.05}$	$\frac{T_n}{.05}$	$\frac{T_n^2}{.05}$	$\frac{T_n}{.05}$	$\frac{R}{.05}$	$\frac{R^2}{.05}$	$\frac{R'}{.05}$
		0.05	0.8706	0.7573	0.5905	0.4870	0.2371	2.1661
		0.15	0.5622	0.3160	1.2306	0.8233	0.6778	2.9048
		0.25	0.4817	0.2321	1.5708	0.8720	0.7604	3.1416
		0.35	0.5598	0.3134	1.9141	0.8199	0.6722	3.4769
		0.45	0.8536	0.7286	2.5601	0.4780	0.2285	4.0874
		0.50	0.9584	0.9378	3.1416	0.0275	0.0008	3.1416
		0.55	0.8494	0.7215	3.7209	0.4759	0.2265	2.2032
		0.65	0.5563	0.3095	4.3645	0.8149	0.6641	2.8086
		0.75	0.4780	0.2285	4.7124	0.8654	0.7490	3.1416
		0.85	0.5540	0.3069	5.0633	0.8117	0.6588	3.4731
		0.95	0.8330	0.6939	5.7125	0.4681	0.2191	4.0501
		1.00	0.9386	0.8809	6.2832	0.0534	0.0028	3.1416
		1.05	0.8290	0.6872	6.8518	0.4663	0.2175	2.2406
		1.15	0.5504	0.3029	7.4986	0.8068	0.6510	2.8125
		1.25	0.4742	0.2249	7.8540	0.8590	0.7379	3.1416
		1.35	0.5480	0.3003	8.2123	0.8036	0.6458	3.4691
		1.45	0.8131	0.6612	8.8643	0.4597	0.2114	4.0127
		1.50	0.9103	0.8286	9.4248	0.0777	0.0060	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{0.000}$	$\frac{r}{0.60}$	$\frac{ds}{0.05}$	$\frac{T_n}{0.3653}$	$\frac{T_n^2}{0.7487}$	$\frac{T_n}{0.6042}$	$\frac{R}{0.5013}$	$\frac{R^2}{0.2513}$	$\frac{R'}{2.1751}$
		0.15	0.5504	0.3029	1.2414	0.8349	0.6971	2.8121
		0.25	0.4706	0.2215	1.5708	0.8824	0.7785	3.1416
		0.35	0.5504	0.3029	1.9002	0.8349	0.6971	3.4710
		0.45	0.8653	0.7487	2.5373	0.5013	0.2513	4.1081
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8653	0.7487	3.7459	0.5013	0.2513	2.1751
		0.65	0.5504	0.3029	4.3829	0.8349	0.6971	2.8121
		0.75	0.4706	0.2215	4.7124	0.8824	0.7785	3.1416
		0.85	0.5504	0.3029	5.0418	0.8349	0.6971	3.4710
		0.95	0.8653	0.7487	5.6789	0.5013	0.2513	4.1081
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8653	0.7487	6.8875	0.5013	0.2513	2.1751
		1.15	0.5504	0.3029	7.5245	0.8349	0.6971	2.8121
		1.25	0.4706	0.2215	7.8540	0.8824	0.7785	3.1416
		1.35	0.5504	0.3029	8.1834	0.8349	0.6971	3.4710
		1.45	0.8653	0.7487	8.8205	0.5013	0.2513	4.1081
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.60}$	$\frac{d_s}{.05}$	$\frac{T_n}{.05}$	$\frac{T_n^2}{.05}$	$\frac{T_n}{.05}$	$\frac{R}{.05}$	$\frac{R^2}{.05}$	$\frac{R'}{.05}$
.005	.60	.05	.05642	.07468	.05037	.05007	.02507	2.1769
		.15	.05496	.03020	1.2402	.08335	.06950	2.8127
		.25	.04697	.02206	1.5708	.08807	.07757	3.1416
		.35	.05484	.03008	1.9030	.08320	.06922	3.4699
		.45	.08556	.07320	2.5427	.04959	.02459	4.0918
		.50	.09836	.09674	3.1416	.00145	.00002	3.1416
		.55	.08535	.07284	3.7393	.04947	.02447	2.1951
		.65	.05468	.02990	4.3778	.08295	.06880	2.8144
		.75	.04680	.02130	4.7124	.08775	.07700	3.1416
		.85	.05456	.02977	5.0485	.08278	.06853	3.4680
		.95	.08450	.07141	5.6902	.04902	.02403	4.0735
		1.00	.09676	.09362	6.2832	.00285	.00008	3.1416
		1.05	.08430	.07106	6.8750	.04891	.02392	2.2134
		1.15	.05440	.02959	7.5155	.08253	.06812	2.8162
		1.25	.04652	.02173	7.8540	.08743	.07644	3.1416
		1.35	.05428	.02947	8.1940	.08237	.06785	3.4662
		1.45	.08347	.06967	8.8375	.04849	.02352	4.0551
		1.50	.09521	.09064	9.4248	.00421	.00018	3.1416

## REPORT NO. NADC-EL-52195

$d_s = \frac{K}{\lambda} \sqrt{e - \sin^2 \theta}$		$P = \frac{4 \tan \delta}{g - \sin^2 \theta}$		$T_n$		$T_n^2$	$\frac{T_n}{d_s}$	$\frac{r}{.60}$	$\frac{P}{.010}$	$\frac{R}{.5001}$	$\frac{R^2}{.02501}$	$\frac{R'}{2.1787}$
0.05	0.8631	0.7449	0.6031	0.5001	0.2501	2.1787						
0.15	0.5487	0.3011	1.2390	0.8324	0.6929	2.8132						
0.25	0.4681	0.2198	1.5708	0.8791	0.7728	3.1416						
0.35	0.5465	0.2986	1.9058	0.8290	0.6873	3.4686						
0.45	0.8461	0.7159	2.5480	0.4907	0.2408	4.0753						
0.50	0.9675	0.9362	3.1416	0.0285	0.0008	3.1416						
0.55	0.8419	0.7088	3.7329	0.4886	0.2387	2.2152						
0.65	0.5431	0.2950	4.3727	0.8241	0.6792	2.8168						
0.75	0.4653	0.2165	4.7124	0.8727	0.7615	3.1416						
0.85	0.5409	0.2925	5.0551	0.8209	0.6738	3.4649						
0.95	0.8255	0.6814	5.7009	0.4805	0.2309	4.0386						
1.00	0.9370	0.8779	6.2832	0.0552	0.0030	3.1416						
1.05	0.8214	0.6748	6.8632	0.4737	0.2291	2.2520						
1.15	0.5375	0.2889	7.5067	0.8161	0.6660	2.8205						
1.25	0.4617	0.2132	7.8540	0.8664	0.7506	3.1416						
1.35	0.5352	0.2864	8.2043	0.8129	0.6609	3.4611						
1.45	0.8056	0.6489	8.8533	0.4718	0.2226	4.0017						
1.50	0.9080	0.8245	9.4248	0.0803	0.0064	3.1416						

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52105

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.61}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8573}$	$\frac{T_n^2}{.7350}$	$\frac{T_n'}{.6174}$	$\frac{R}{.5148}$	$\frac{R^2}{.2650}$	$\frac{R'}{2.1882}$
		0.15	0.5368	0.2881	1.2498	0.8437	0.7119	2.8206
		0.25	0.4576	0.2094	1.5708	0.8891	0.7906	3.1416
		0.35	0.5368	0.2881	1.8918	0.8437	0.7119	3.4626
		0.45	0.8573	0.7350	2.5242	0.5148	0.2650	4.0950
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8573	0.7350	3.7590	0.5148	0.2650	2.1882
		0.65	0.5368	0.2881	4.3914	0.8437	0.7119	2.8206
		0.75	0.4576	0.2094	4.7124	0.8891	0.7906	3.1416
		0.85	0.5368	0.2881	5.0334	0.8437	0.7119	3.4626
		0.95	0.8573	0.7350	5.6658	0.5148	0.2650	4.0950
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8573	0.7350	6.9006	0.5148	0.2650	2.1882
		1.15	0.5368	0.2881	7.5330	0.8437	0.7119	2.8206
		1.25	0.4576	0.2094	7.8540	0.8891	0.7906	3.1416
		1.35	0.5368	0.2881	8.1750	0.8437	0.7119	3.4626
		1.45	0.8573	0.7350	8.8074	0.5148	0.2650	4.0950
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.61}$	$\frac{ds}{.05}$	$\frac{T_n}{.0563}$	$\frac{T_n^2}{.07332}$	$\frac{T_n'}{.06168}$	$\frac{R}{.05141}$	$\frac{R^2}{.02643}$	$\frac{R'}{2.1900}$
		0.05		0.7332	0.6168	0.5141	0.2643	2.1900
		0.15	0.5360	0.2873	1.2486	0.8425	0.7098	2.8211
		0.25	0.4568	0.2087	1.5705	0.8876	0.7878	3.1416
		0.35	0.5349	0.2861	1.8946	0.8408	0.7070	3.4614
		0.45	0.8477	0.7186	2.5299	0.5091	0.2592	4.0789
		0.50	0.9931	0.9665	3.1416	0.0150	0.0002	3.1416
		0.55	0.8456	0.7150	3.7521	0.5079	0.2579	2.2078
		0.65	0.5333	0.2844	4.3862	0.8384	0.7028	2.8228
		0.75	0.4551	0.2071	4.7124	0.8844	0.7821	3.1416
		0.85	0.5322	0.2833	5.0402	0.8367	0.7001	3.4597
		0.95	0.8371	0.7078	5.6776	0.5032	0.2532	4.0610
		1.00	0.9667	0.9345	6.2832	0.0295	0.0009	3.1416
		1.05	0.8350	0.6973	6.8875	0.5021	0.2521	2.2258
		1.15	0.5306	0.2816	7.5238	0.8343	0.6960	2.8245
		1.25	0.4535	0.2056	7.8540	0.8812	0.7766	3.1416
		1.35	0.5295	0.2804	8.1858	0.8327	0.6933	3.4580
		1.45	0.8267	0.6835	8.8253	0.4977	0.2477	4.0429
		1.50	0.9508	0.9040	9.4248	0.0435	0.0019	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n^3}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.10	.61	0.05	0.8552	0.7313	0.6161	0.5135	0.2636	2.1918
		0.15	0.5352	0.2864	1.2474	0.8412	0.7077	2.8216
		0.25	0.4560	0.2079	1.5708	0.8860	0.7849	3.1416
		0.35	0.5330	0.2841	1.8974	0.8379	0.7022	3.4602
		0.45	0.8382	0.7025	2.5354	0.5038	0.2538	4.0628
		0.50	0.9667	0.9345	2.1416	0.0295	0.0009	3.1416
		0.55	0.8340	0.6955	3.7453	0.5015	0.2515	2.2276
		0.65	0.5208	0.2807	4.3810	0.8331	0.6940	2.8250
		0.75	0.4526	0.2049	4.7124	0.8797	0.7738	3.1416
		0.85	0.3276	0.2764	5.0470	0.8299	0.6887	3.4568
		0.95	0.8175	0.6634	5.6890	0.4932	0.2432	4.0266
		1.00	0.9353	0.8748	6.2832	0.0571	0.0033	3.1416
		1.05	0.8135	0.6618	6.8751	0.4912	0.2413	2.2638
		1.15	0.5244	0.2750	7.5147	0.8251	0.6808	2.8286
		1.25	0.4492	0.2018	7.8540	0.8735	0.7629	3.1416
		1.35	0.5222	0.2727	8.1963	0.8220	0.6757	3.4531
		1.45	0.7976	0.6362	8.8419	0.4841	0.2343	3.9904
		1.50	0.9057	0.8203	9.4248	0.0830	0.0069	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$				
$\frac{P}{.001}$	$\frac{r}{.62}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8490}$	$\frac{T_n^2}{.7207}$	$\frac{T_n}{1.2583}$	$\frac{R}{.5284}$	$\frac{R^2}{.2793}$	$\frac{R'}{2.2018}$
		0.05	0.8490	0.7207	0.6310	0.5284	0.2793	2.2018
		0.15	0.5230	0.2736	1.2583	0.8523	0.7264	2.8291
		0.25	0.4447	0.1977	1.5708	0.8957	0.8023	3.1416
		0.35	0.5230	0.2736	1.8833	0.8523	0.7264	3.4541
		0.45	0.8490	0.7207	2.5106	0.5284	0.2793	4.0814
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8490	0.7207	3.7726	0.5284	0.2793	2.2018
		0.65	0.5230	0.2736	4.3094	0.8523	0.7264	2.8291
		0.75	0.4447	0.1977	4.7124	0.8957	0.8023	3.1416
		0.85	0.5230	0.2736	5.0249	0.8523	0.7264	3.4541
		0.95	0.8490	0.7207	5.6522	0.5284	0.2793	4.0814
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8490	0.7207	6.9142	0.5284	0.2793	2.2018
		1.15	0.5230	0.2736	7.5415	0.8523	0.7264	2.8291
		1.25	0.4447	0.1977	7.8540	0.8957	0.8023	3.1416
		1.35	0.5230	0.2736	8.1665	0.8523	0.7264	3.4541
		1.45	0.8490	0.7207	8.7937	0.5284	0.2793	4.0814
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{p}{.005}$	$\frac{r}{.62}$	$\frac{ds}{.05}$	$\frac{T_n}{.8479}$	$\frac{T_n^2}{.7189}$	$\frac{T_n}{1.2571}$	$\frac{R}{0.5278}$	$\frac{R''}{0.2735}$	$\frac{R'}{2.2036}$
		0.15	0.5223	0.2728	1.2571	0.8511	0.7243	2.8296
		0.25	0.4439	0.1970	1.5708	0.8941	0.7995	3.1416
		0.35	0.5213	0.2717	1.8862	0.8494	0.7216	3.4530
		0.45	0.8393	0.7045	2.5166	0.5226	0.2731	4.0656
		0.50	0.9826	0.9655	3.1416	0.0155	0.0002	3.1416
		0.55	0.8372	0.7009	3.7553	0.5213	0.2718	2.2211
		0.65	0.5197	0.2701	4.3945	0.8470	0.7174	2.8312
		0.75	0.4423	0.1956	4.7124	0.8910	0.7939	3.1416
		0.85	0.5187	0.2691	5.0319	0.8454	0.7147	3.4514
		0.95	0.8288	0.6868	5.6647	0.5165	0.2667	4.0480
		1.00	0.9658	0.9327	6.2832	0.0306	0.0009	3.1416
		1.05	0.8267	0.6834	6.9004	0.5153	0.2655	2.2387
		1.15	0.5172	0.2675	7.5321	0.8430	0.7106	2.8328
		1.25	0.4407	0.1942	7.8540	0.8879	0.7884	3.1416
		1.35	0.5161	0.2664	8.1775	0.8414	0.7079	3.4497
		1.45	0.8184	0.6698	8.8126	0.5108	0.2609	4.0303
		1.50	0.9494	0.9014	9.4246	0.0451	0.0020	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{\pi}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{4 - \sin^2 \theta}$			
$\frac{P}{0.010}$	$\frac{r}{0.52}$	$\frac{ds}{0.05}$	$\frac{T_n}{0.8468}$	$\frac{T_n^2}{0.7171}$	$\frac{T_n}{0.6497}$
					$\frac{R}{0.5271}$
					$\frac{R^2}{0.2778}$
					$\frac{R'}{2.2053}$
0.15		0.5215	0.8468	0.7171	0.6497
0.25		0.4431	0.8468	0.7171	1.2958
0.35		0.5195	0.8468	0.7171	1.5708
0.45		0.8298	0.8468	0.7171	1.8890
0.50		0.9658	0.8468	0.7171	2.5724
0.55		0.8256	0.8468	0.7171	3.1416
0.65		0.5164	0.8468	0.7171	0.0306
0.75		0.4399	0.8468	0.7171	0.5147
0.85		0.5143	0.8468	0.7171	0.8418
0.95		0.8092	0.8468	0.7171	0.8864
1.00		0.9336	0.8468	0.7171	0.8386
1.05		0.8052	0.8468	0.7171	0.5060
1.15		0.5112	0.8468	0.7171	0.0591
1.25		0.4367	0.8468	0.7171	0.5040
1.35		0.5092	0.8468	0.7171	0.8339
1.45		0.7893	0.8468	0.7171	0.8803
1.50		0.9032	0.8468	0.7171	0.8309
					0.4966
					0.0858
					0.0074
					3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.000	.63	0.05	0.8401	0.7058	0.6451	0.5424	0.2942	2.2159
		0.15	0.5092	0.2593	1.2668	0.8606	0.7407	2.8376
		0.25	0.4317	0.1864	1.5708	0.9020	0.8136	3.1416
		0.35	0.5092	0.2593	1.8748	0.8606	0.7407	3.4456
		0.45	0.8401	0.7058	2.4964	0.5424	0.2942	4.0672
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8401	0.7058	3.7867	0.5424	0.2942	2.2159
		0.65	0.5092	0.2593	4.4084	0.8606	0.7407	2.8376
		0.75	0.4317	0.1864	4.7124	0.9020	0.8136	3.1416
		0.85	0.5092	0.2593	5.0163	0.8606	0.7407	3.4456
		0.95	0.8401	0.7058	5.6380	0.5424	0.2942	4.0672
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8401	0.7058	6.9283	0.5424	0.2942	2.2159
		1.15	0.5092	0.2593	7.5500	0.8606	0.7407	2.8376
		1.25	0.4317	0.1864	7.8540	0.9020	0.8136	3.1416
		1.35	0.5092	0.2593	8.1579	0.8606	0.7407	3.4456
		1.45	0.8401	0.7058	8.7796	0.5424	0.2942	4.0672
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

REPORT NO. NADC-EL-52195

$\frac{P}{.005}$	$\frac{r}{.63}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8391}$	$\frac{T_n^2}{0.7040}$	$\frac{T_n''}{0.6444}$	$\frac{R}{0.5417}$	$\frac{R^2}{0.2934}$	$\frac{R'}{2.2177}$
	0.15	0.5085	0.4310	0.2585	1.2656	0.8594	0.7386	2.8381
	0.25	0.4310	0.1858	0.2576	1.5708	0.9005	0.8108	3.1416
	0.35	0.5075	0.2576	0.6897	2.5028	0.5363	0.2876	4.0518
	0.45	0.8305	0.9645	3.1416	3.7790	0.5350	0.2862	2.2348
	0.55	0.8284	0.6862	4.4030	4.7124	0.8554	0.7317	2.8396
	0.65	0.5061	0.1845	0.2551	5.0235	0.8538	0.7290	3.4430
	0.75	0.4295	0.2551	0.5723	5.6512	0.5300	0.2809	4.0345
	0.85	0.5051	0.9306	6.2832	6.9138	0.0317	0.0010	3.1416
	0.95	0.8200	0.6689	7.5404	7.8540	0.5238	0.2796	2.2521
	1.00	0.9548	0.2536	0.1832	7.8540	0.8514	0.7250	2.8411
	1.05	0.8179	0.1832	0.2527	8.1692	0.8944	0.8000	3.1416
	1.15	0.5036	0.2527	0.6555	8.7995	0.8499	0.7223	3.4414
	1.25	0.4280	0.6555	8.7995	9.4248	0.5241	0.2747	4.0171
	1.35	0.5027	0.8987	0.9480	0.0022	0.0457	0.0022	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{e - \sin^2 \theta}}{\lambda}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n^3}{\lambda}$	$\frac{R}{e - \sin^2 \theta}$	$\frac{R^2}{e - \sin^2 \theta}$	$\frac{R^3}{e - \sin^2 \theta}$
.010	.63	0.05	0.8380	0.7022	0.6437	0.5410	0.2927	2.2194
		0.15	0.5078	0.2578	1.2643	0.8582	0.7365	2.8385
		0.25	0.4303	0.1851	1.5708	0.8989	0.8081	3.1416
		0.35	0.5058	0.2559	1.8806	0.8550	0.7311	3.4434
		0.45	0.8210	0.6741	2.5090	0.5306	0.2815	4.0363
		0.50	0.9648	0.9308	3.1416	0.0317	0.0010	3.1416
		0.55	0.8168	0.6672	3.7715	0.5282	0.2790	2.2530
		0.65	0.5029	0.2529	4.3976	0.8503	0.7230	2.8416
		0.75	0.4273	0.1826	4.7124	0.8929	0.7973	3.1416
		0.85	0.5009	0.2509	5.0305	0.8471	0.7177	3.4403
		0.95	0.8004	0.6407	5.6638	0.5192	0.2695	4.0014
		1.00	0.9317	0.8681	6.2832	0.0612	0.0037	3.1416
		1.05	0.7964	0.6343	6.9000	0.5171	0.2674	2.2838
		1.15	0.4980	0.2480	7.5310	0.8425	0.7008	2.8448
		1.25	0.4242	0.1800	7.8540	0.8870	0.7867	3.1416
		1.35	0.4950	0.2460	8.1802	0.8395	0.7047	3.4370
		1.45	0.7806	0.6093	8.8180	0.5094	0.2595	3.9664
		1.50	0.9007	0.8112	9.4248	0.0887	0.0079	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{r}{r}$	$\frac{ds}{ds}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$
.000	.64	.05	.05	.05	.05
		.15	.15	.15	.15
		.25	.25	.25	.25
		.35	.35	.35	.35
		.45	.45	.45	.45
		.50	.50	.50	.50
		.55	.55	.55	.55
		.65	.65	.65	.65
		.75	.75	.75	.75
		.85	.85	.85	.85
		.95	.95	.95	.95
		1.00	1.00	1.00	1.00
		1.05	1.05	1.05	1.05
		1.15	1.15	1.15	1.15
		1.25	1.25	1.25	1.25
		1.35	1.35	1.35	1.35
		1.45	1.45	1.45	1.45
		1.50	1.50	1.50	1.50

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.005	.64	0.05	0.8297	0.6884	0.6590	0.5559	0.3090	2.2322
		0.15	0.4946	0.2446	1.2741	0.8675	0.7526	2.8466
		0.25	0.4182	0.1749	1.5708	0.9066	0.8219	3.1416
		0.35	0.4937	0.2437	1.8692	0.8659	0.7499	3.4360
		0.45	0.8212	0.6743	2.4885	0.5503	0.3028	4.0375
		0.50	0.9816	0.9635	3.1416	0.0167	0.0003	3.1416
		0.55	0.8191	0.6709	3.7933	0.5490	0.3014	2.2490
		0.65	0.4923	0.2424	4.4114	0.8636	0.7458	2.8480
		0.75	0.4168	0.1737	4.7124	0.9036	0.8165	3.1416
		0.85	0.4914	0.2415	5.0151	0.8620	0.7431	3.4346
		0.95	0.8107	0.6572	5.6373	0.5438	0.2957	4.0206
		1.00	0.9637	0.9288	6.2832	0.0328	0.0011	3.1416
		1.05	0.8086	0.6538	6.9277	0.5425	0.2943	2.2660
		1.15	0.4900	0.2401	7.5488	0.8597	0.7390	2.8495
		1.25	0.4153	0.1725	7.8540	0.9007	0.8112	3.1416
		1.35	0.4891	0.2392	8.1609	0.8581	0.7364	3.4331
		1.45	0.8004	0.6406	8.7859	0.5377	0.2891	4.0036
		1.50	0.9465	0.8958	9.4248	0.0484	0.0023	3.1416

**REPORT NO. NADC-EL-52195**

195

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.65}$	$\frac{ds}{.05}$	$\frac{T_n}{.8209}$	$\frac{T_n^2}{.6739}$	$\frac{T_n'}{.6750}$	$\frac{R}{.5710}$	$\frac{R^2}{.3261}$	$\frac{R'}{2.2457}$
		0.05	0.8209	0.6739	0.6750	0.5710	0.3261	2.2457
		0.15	0.4813	0.2317	1.2840	0.8765	0.7683	2.8548
		0.25	0.4060	0.1648	1.5708	0.9139	0.8352	3.1416
		0.35	0.4813	0.2317	1.8576	0.8765	0.7683	3.4284
		0.45	0.8209	0.6739	2.4666	0.5710	0.3261	4.0374
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8209	0.6739	3.8165	0.5710	0.3261	2.2457
		0.65	0.4813	0.2317	4.4256	0.8765	0.7683	2.8548
		0.75	0.4060	0.1648	4.7124	0.9139	0.8352	3.1416
		0.85	0.4813	0.2317	4.9992	0.8765	0.7683	3.4284
		0.95	0.8209	0.6739	5.6082	0.5710	0.3261	4.0374
		1.00	1.0000	1.0000	5.2832	0.0000	0.0000	1.5708
		1.05	0.8209	0.6739	6.9581	0.5710	0.3261	2.2457
		1.15	0.4813	0.2317	7.5672	0.8765	0.7683	2.8548
		1.25	0.4060	0.1648	7.8540	0.9139	0.8352	3.1416
		1.35	0.4813	0.2317	8.1408	0.8765	0.7683	3.4284
		1.45	0.8209	0.6739	8.7498	0.5710	0.3261	4.0374
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{.005}$	$\frac{r}{.65}$	$\frac{d_s}{.005}$	$\frac{T_n}{.005}$	$\frac{T_n^2}{.005}$	$\frac{T_n}{.005}$	$\frac{R}{.005}$	$\frac{R^2}{.005}$	$\frac{R'}{.005}$
1.00	1.00	0.9626	0.4776	0.2281	5.0066	0.9095	0.8273	3.1416
1.05	1.05	0.7988	0.4040	0.1632	4.7124	0.8699	0.7568	3.4261
1.10	1.10	0.4763	0.4027	0.1622	5.6228	0.5578	0.3111	4.0062
1.15	1.15	0.4754	0.4027	0.1622	7.5572	0.8676	0.7528	2.8579
1.20	1.20	0.4754	0.4027	0.1622	8.1525	0.8661	0.7502	3.4247
1.25	1.25	0.4754	0.4027	0.1622	8.7718	0.5515	0.3041	3.9895
1.30	1.30	0.4754	0.4027	0.1622	9.4248	0.0501	0.0025	3.1416
1.35	1.35	0.4754	0.4027	0.1622				
1.40	1.40	0.4754	0.4027	0.1622				
1.45	1.45	0.4754	0.4027	0.1622				
1.50	1.50	0.4754	0.4027	0.1622				
1.55	1.55	0.4754	0.4027	0.1622				
1.60	1.60	0.4754	0.4027	0.1622				
1.65	1.65	0.4754	0.4027	0.1622				
1.70	1.70	0.4754	0.4027	0.1622				
1.75	1.75	0.4754	0.4027	0.1622				
1.80	1.80	0.4754	0.4027	0.1622				
1.85	1.85	0.4754	0.4027	0.1622				
1.90	1.90	0.4754	0.4027	0.1622				
1.95	1.95	0.4754	0.4027	0.1622				
2.00	2.00	0.4754	0.4027	0.1622				
2.05	2.05	0.4754	0.4027	0.1622				
2.10	2.10	0.4754	0.4027	0.1622				
2.15	2.15	0.4754	0.4027	0.1622				
2.20	2.20	0.4754	0.4027	0.1622				
2.25	2.25	0.4754	0.4027	0.1622				
2.30	2.30	0.4754	0.4027	0.1622				
2.35	2.35	0.4754	0.4027	0.1622				
2.40	2.40	0.4754	0.4027	0.1622				
2.45	2.45	0.4754	0.4027	0.1622				
2.50	2.50	0.4754	0.4027	0.1622				
2.55	2.55	0.4754	0.4027	0.1622				
2.60	2.60	0.4754	0.4027	0.1622				
2.65	2.65	0.4754	0.4027	0.1622				
2.70	2.70	0.4754	0.4027	0.1622				
2.75	2.75	0.4754	0.4027	0.1622				
2.80	2.80	0.4754	0.4027	0.1622				
2.85	2.85	0.4754	0.4027	0.1622				
2.90	2.90	0.4754	0.4027	0.1622				
2.95	2.95	0.4754	0.4027	0.1622				
3.00	3.00	0.4754	0.4027	0.1622				
3.05	3.05	0.4754	0.4027	0.1622				
3.10	3.10	0.4754	0.4027	0.1622				
3.15	3.15	0.4754	0.4027	0.1622				
3.20	3.20	0.4754	0.4027	0.1622				
3.25	3.25	0.4754	0.4027	0.1622				
3.30	3.30	0.4754	0.4027	0.1622				
3.35	3.35	0.4754	0.4027	0.1622				
3.40	3.40	0.4754	0.4027	0.1622				
3.45	3.45	0.4754	0.4027	0.1622				
3.50	3.50	0.4754	0.4027	0.1622				
3.55	3.55	0.4754	0.4027	0.1622				
3.60	3.60	0.4754	0.4027	0.1622				
3.65	3.65	0.4754	0.4027	0.1622				
3.70	3.70	0.4754	0.4027	0.1622				
3.75	3.75	0.4754	0.4027	0.1622				
3.80	3.80	0.4754	0.4027	0.1622				
3.85	3.85	0.4754	0.4027	0.1622				
3.90	3.90	0.4754	0.4027	0.1622				
3.95	3.95	0.4754	0.4027	0.1622				
4.00	4.00	0.4754	0.4027	0.1622				
4.05	4.05	0.4754	0.4027	0.1622				
4.10	4.10	0.4754	0.4027	0.1622				
4.15	4.15	0.4754	0.4027	0.1622				
4.20	4.20	0.4754	0.4027	0.1622				
4.25	4.25	0.4754	0.4027	0.1622				
4.30	4.30	0.4754	0.4027	0.1622				
4.35	4.35	0.4754	0.4027	0.1622				
4.40	4.40	0.4754	0.4027	0.1622				
4.45	4.45	0.4754	0.4027	0.1622				
4.50	4.50	0.4754	0.4027	0.1622				
4.55	4.55	0.4754	0.4027	0.1622				
4.60	4.60	0.4754	0.4027	0.1622				
4.65	4.65	0.4754	0.4027	0.1622				
4.70	4.70	0.4754	0.4027	0.1622				
4.75	4.75	0.4754	0.4027	0.1622				
4.80	4.80	0.4754	0.4027	0.1622				
4.85	4.85	0.4754	0.4027	0.1622				
4.90	4.90	0.4754	0.4027	0.1622				
4.95	4.95	0.4754	0.4027	0.1622				
5.00	5.00	0.4754	0.4027	0.1622				

## REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{p}{.010}$	$\frac{r}{.65}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8188}$	$\frac{T_n^2}{0.6704}$	$\frac{T_n}{0.6734}$	$\frac{R}{0.5696}$	$\frac{R'}{2.7490}$
		0.05	0.4800	0.2304	1.2813	0.8742	2.8556
		0.15	0.4047	0.1638	1.5708	0.9110	3.1416
		0.25	0.4783	0.2287	1.8637	0.8711	3.4263
		0.35	0.8019	0.6431	2.4805	0.5584	4.0078
		0.45	0.9626	0.9267	3.1416	0.0340	3.1416
		0.50	0.7978	0.6365	3.7997	0.5558	2.2820
		0.55	0.4756	0.2262	4.4143	0.8665	2.8583
		0.65	0.4020	0.1616	4.7124	0.9052	3.1416
		0.75	0.4734	0.2246	5.0139	0.8635	3.4237
		0.85	0.7815	0.6108	5.6368	0.5462	3.0744
		1.00	0.9277	0.8607	6.2832	0.0656	3.1416
		1.05	0.7775	0.6045	6.9268	0.5439	2.3155
		1.15	0.4712	0.2220	7.5474	0.8590	2.8612
		1.25	0.3993	0.1594	7.8540	0.8996	3.1416
		1.35	0.4694	0.2203	8.1639	0.8560	3.4207
		1.45	0.7618	0.5803	8.7923	0.5356	3.9407
		1.50	0.8951	0.8012	9.4248	0.0950	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.66}$	$\frac{ds}{.05}$	$\frac{T_n}{.8105}$	$\frac{T_n^2}{.6569}$	$\frac{T_n'}{.6907}$	$\frac{R}{.5858}$	$\frac{R^2}{.3431}$	$\frac{R'}{2.2615}$
		0.05	0.8105	0.6569	0.6907	0.5858	0.3431	2.2615
		0.15	0.4673	0.2183	1.2926	0.8841	0.7817	2.8634
		0.25	0.3931	0.1546	1.5708	0.9195	0.8454	3.1416
		0.35	0.4673	0.2183	1.8490	0.8841	0.7817	2.4198
		0.45	0.8105	0.6559	2.4509	0.5858	0.3431	4.0217
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.8105	0.6559	3.8323	0.5858	0.3431	2.2615
		0.65	0.4673	0.2183	4.4342	0.8841	0.7817	2.8634
		0.75	0.3931	0.1546	4.7124	0.9195	0.8454	3.1416
		0.85	0.4673	0.2183	4.9906	0.8841	0.7817	3.4198
		0.95	0.8105	0.6559	5.5925	0.5858	0.3431	4.0217
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.8105	0.6559	6.9739	0.5858	0.3431	2.2615
		1.15	0.4673	0.2183	7.5758	0.8841	0.7817	2.8634
		1.25	0.3931	0.1546	7.8540	0.9195	0.8454	3.1416
		1.35	0.4673	0.2183	8.1322	0.8841	0.7817	3.4198
		1.45	0.8105	0.6559	8.7341	0.5858	0.3431	4.0217
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.66}$	$\frac{ds}{.05}$	$\frac{T_n}{.8094}$	$\frac{T_n^2}{.6552}$	$\frac{T_n}{.6898}$	$\frac{R}{.5850}$	$\frac{R^2}{.3422}$	$\frac{R'}{2.2631}$
		0.15	0.4567	0.2178	1.2912	0.8830	0.7796	2.8637
		0.25	0.3925	0.1541	1.5708	0.9191	0.8428	3.1416
		0.35	0.4658	0.2170	1.8521	0.8814	0.7769	3.4189
		0.45	0.8010	0.6416	2.4583	0.5790	0.3353	4.0073
		0.50	0.9804	0.9612	3.1416	0.0180	0.0003	3.1416
		0.55	0.7989	0.6382	3.8233	0.5776	0.3336	2.2791
		0.65	0.4646	0.2159	4.4284	0.8791	0.7729	2.8650
		0.75	0.3913	0.1531	4.7124	0.9152	0.8377	3.1416
		0.85	0.4638	0.2151	4.9981	0.8776	0.7702	3.4176
		0.95	0.7906	0.6250	5.6079	0.5720	0.3272	3.9912
		1.00	0.9615	0.9244	6.2832	0.0353	0.0012	3.1416
		1.05	0.7885	0.6218	6.9569	0.5707	0.3257	2.2952
		1.15	0.4625	0.2139	7.5656	0.8754	0.7663	2.8663
		1.25	0.3901	0.1521	7.8540	0.9124	0.8325	3.1416
		1.35	0.4617	0.2132	8.1441	0.8739	0.7636	3.4183
		1.45	0.7804	0.6090	8.7573	0.5655	0.3198	3.9749
		1.50	0.9432	0.8896	9.4248	0.0520	0.0027	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan\beta}{\epsilon - \sin^2\theta}$$

$\frac{P}{.010}$	$\frac{r}{.56}$	$\frac{d_s}{.05}$	$\frac{T_n}{.8084}$	$\frac{T_n^2}{0.6535}$	$\frac{T_n}{0.5890}$	$\frac{R}{0.5842}$	$\frac{R^2}{0.3413}$	$\frac{R'}{2.2646}$
		0.15	0.4660	0.2172	1.2899	0.8818	0.7776	2.8641
		0.25	0.3919	0.1536	1.5708	0.9166	0.8402	3.1416
		0.35	0.4644	0.2157	1.8552	0.8788	0.7722	3.4180
		0.45	0.7916	0.6267	2.4655	0.5727	0.3280	3.9928
		0.50	0.9615	0.9244	3.1416	0.0353	0.0012	3.1416
		0.55	0.7875	0.6202	3.8145	0.5700	0.3249	2.2969
		0.65	0.4619	0.2134	4.4227	0.8742	0.7643	2.8667
		0.75	0.3894	0.1517	4.7124	0.9110	0.8300	3.1416
		0.85	0.4602	0.2118	5.0056	0.8713	0.7591	3.4154
		0.95	0.7713	0.5949	5.6225	0.5600	0.3136	3.9602
		1.00	0.9256	0.8567	6.2832	0.0680	0.0046	3.1416
		1.05	0.7673	0.5888	6.9409	0.5577	0.3110	2.3296
		1.15	0.4577	0.2095	7.5557	0.8669	0.7514	2.8695
		1.25	0.3869	0.1497	7.8540	0.9055	0.8199	3.1416
		1.35	0.4560	0.2079	8.1557	0.8640	0.7464	3.4125
		1.45	0.7517	0.5650	8.7788	0.5491	0.3015	3.9272
		1.50	0.8920	0.7957	9.4248	0.0984	0.0097	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$									
P	r	ds	Tn	Tn <sup>2</sup>	Tn	R	R <sup>2</sup>	R'	
.000	.67	.05	.7995	.6392	.7070	.6007	.3608	2.2778	
		.15	.4532	.2054	1.3012	.8914	.7946	2.8720	
		.25	.3804	.1447	1.5708	.9248	.8553	3.1416	
		.35	.4532	.2054	1.8404	.8914	.7946	3.4112	
		.45	.7995	.6392	2.4346	.6007	.3608	4.0054	
		.50	1.0000	1.0000	3.1416	.0000	.0000	1.5708	
		.55	.7995	.6392	3.8485	.6007	.3608	2.2778	
		.65	.4532	.2054	4.4428	.8914	.7946	2.8720	
		.75	.3804	.1447	4.7124	.9248	.8553	3.1416	
		.85	.4532	.2054	4.9820	.8914	.7946	3.4112	
		.95	.7995	.6392	5.5762	.6007	.3608	4.0054	
		1.00	1.0000	1.0000	6.2832	.0000	.0000	1.5708	
		1.05	.7995	.6392	6.9901	.6007	.3608	2.2778	
		1.15	.4532	.2054	7.5844	.8914	.7946	2.8720	
		1.25	.3804	.1447	7.8540	.9248	.8553	3.1416	
		1.35	.4532	.2054	8.1236	.8914	.7946	3.4112	
		1.45	.7995	.6392	8.7178	.6007	.3608	4.0054	
		1.50	1.0000	1.0000	9.4248	.0000	.0000	1.5708	

REPORT NO. NADC-EL-52195

$$P = \frac{c \tan \delta}{c - \sin^2 \theta}$$

$\frac{P}{r}$	$\frac{r}{d_s}$	$T_n$	$\frac{T_n^2}{T_n'}$	$\frac{T_n'}{R}$	$\frac{R^2}{R'}$	$R'$
.005	.67	0.7984	0.6375	0.7061	0.5999	2.2793
		0.4526	0.2048	1.2998	0.8903	2.8723
		0.3798	0.1442	1.5708	0.9235	3.1416
		0.4518	0.2041	1.8436	0.8858	3.4104
		0.7900	0.6242	2.4424	0.5938	3.9914
		0.9797	0.9599	3.1416	0.0187	3.1416
		0.7880	0.6209	3.8391	0.5923	2.2449
		0.4506	0.2031	4.4369	0.8866	2.8735
		0.3786	0.1434	4.7124	0.9207	3.1416
		0.4499	0.2024	4.9897	0.8851	3.4002
		0.7797	0.6060	5.5924	0.5866	3.9757
		0.9602	0.9220	6.2822	0.0367	3.1416
		0.7777	0.6048	6.4723	0.5852	2.2106
		0.4487	0.2013	7.5740	0.8828	2.8748
		0.3775	0.1425	7.8540	0.9180	3.1416
		0.4479	0.2006	8.1357	0.8814	3.4079
		0.7696	0.5923	8.7422	0.5798	3.9598
		0.9414	0.8863	9.4248	0.0539	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$D = \frac{\epsilon \tan\theta}{\epsilon - \sin^2\theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.010	.67	0.05	0.7974	0.6358	0.7052	0.5991	0.3590	2.2808
		0.15	0.4520	0.2043	1.2985	0.8892	0.7906	2.8727
		0.25	0.3792	0.1438	1.5708	0.9221	0.8502	3.1416
		0.35	0.4505	0.2029	1.8467	0.8862	0.7853	3.4095
		0.45	0.7808	0.6095	2.4500	0.5873	0.3449	3.9773
		0.50	0.9602	0.9220	3.1416	0.0367	0.0013	3.1416
		0.55	0.7767	0.6032	3.8299	0.5845	0.3416	2.3122
		0.65	0.4481	0.2008	4.4311	0.8817	0.7775	2.8751
		0.75	0.3769	0.1420	4.7124	0.9166	0.8402	3.1416
		0.85	0.4465	0.1994	4.9972	0.8786	0.7723	3.4070
		0.95	0.7606	0.5785	5.6078	0.5741	0.3296	3.9454
		1.00	0.9233	0.8524	6.2832	0.0705	0.0050	3.1416
		1.05	0.7566	0.5725	6.9555	0.5717	0.3269	2.3442
		1.15	0.4441	0.1972	7.5639	0.8745	0.7647	2.8778
		1.25	0.3745	0.1402	7.8540	0.9112	0.8304	3.1416
		1.35	0.4425	0.1958	8.1475	0.8716	0.7598	3.4043
		1.45	0.7411	0.5492	8.7648	0.5628	0.3168	3.9132
		1.50	0.8888	0.7901	9.4248	0.1019	0.0104	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.00	0.05	0.7878	0.6207	0.7238	0.6159	0.3793	2.2946
	0.15	0.4390	0.1927	1.3098	0.8985	0.8073	2.8806
	0.25	0.3676	0.1351	1.5708	0.9300	0.8649	3.1416
	0.35	0.4390	0.1927	1.8318	0.8985	0.8073	3.4025
	0.45	0.7878	0.6207	2.4178	0.6159	0.3793	3.9886
	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.7878	0.6207	3.8654	0.6159	0.3793	2.2946
	0.65	0.4390	0.1927	4.4514	0.8985	0.8073	2.8806
	0.75	0.3676	0.1351	4.7124	0.9300	0.8649	3.1416
	0.85	0.4390	0.1927	4.9734	0.8985	0.8073	3.4025
	0.95	0.7878	0.6207	5.5594	0.6159	0.3793	3.9886
	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	0.7878	0.6207	7.0070	0.6159	0.3793	2.2946
	1.15	0.4390	0.1927	7.5930	0.8985	0.8073	2.8806
	1.25	0.3676	0.1351	7.8540	0.9300	0.8649	3.1416
	1.35	0.4390	0.1927	8.1150	0.8985	0.8073	3.4026
	1.45	0.7878	0.6207	8.7010	0.6159	0.3793	3.9886
	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
.005	.68	0.7868	0.6190	0.7229	0.6151	0.3783	2.2961
		0.4385	0.1923	1.3084	0.8974	0.8053	2.8809
		0.3671	0.1347	1.5708	0.9286	0.8624	3.1416
		0.4377	0.1916	1.8350	0.8959	0.8026	3.4018
		0.7735	0.6061	2.4259	0.6087	0.3706	3.9750
		0.9791	0.9535	3.1416	0.0195	0.0004	3.1416
		0.7764	0.6029	3.8555	0.6072	0.3687	2.3113
		0.4366	0.1907	4.4454	0.8937	0.7987	2.8821
		0.3660	0.1340	4.7124	0.9260	0.8574	3.1416
		0.4359	0.1900	4.9812	0.8923	0.7961	3.4007
		0.7683	0.5903	5.5763	0.6013	0.3616	3.9597
		0.9589	0.9195	6.2832	0.0381	0.0015	3.1416
		0.7663	0.5871	6.9883	0.5939	0.3598	2.3256
		0.4348	0.1890	7.5825	0.8901	0.7922	2.8832
		0.3649	0.1332	7.8540	0.9233	0.8525	3.1416
		0.4341	0.1884	8.1273	0.8886	0.7897	3.3995
		0.7582	0.5749	8.7265	0.5943	0.3532	3.9442
		0.9395	0.8827	9.4248	0.0560	0.0031	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	$\frac{d_s}{r}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
.010	.68	0.05	0.7858	0.6174	0.7220	0.6143	0.3773	2.2976
		0.15	0.4379	0.1918	1.3070	0.8963	0.8033	2.8813
		0.25	0.3665	0.1344	1.5708	0.9273	0.8599	3.1416
		0.35	0.4365	0.1905	1.8382	0.8933	0.7981	3.4010
		0.45	0.7693	0.5918	2.4339	0.6020	0.3624	3.9612
		0.50	0.9589	0.9195	3.1416	0.0381	0.0015	3.1416
		0.55	0.7652	0.5856	3.8458	0.5992	0.3590	2.3281
		0.65	0.4342	0.1886	4.4395	0.8890	0.7903	2.8836
		0.75	0.3644	0.1328	4.7124	0.9220	0.8501	3.1416
		0.85	0.4327	0.1873	4.9888	0.8861	0.7852	3.3986
		0.95	0.7403	0.5615	5.5925	0.5885	0.3463	3.9301
		1.00	0.9208	0.8479	6.2632	0.0732	0.0054	3.1416
		1.05	0.7454	0.5556	6.9706	0.5860	0.3434	2.3593
		1.15	0.4305	0.1853	7.5722	0.8819	0.7778	2.8860
		1.25	0.3621	0.1311	7.8540	0.9168	0.8404	3.1416
		1.35	0.4290	0.1840	8.1393	0.8791	0.7728	3.3961
		1.45	0.7300	0.5328	8.7503	0.5768	0.3327	3.8987
		1.50	0.8855	0.7841	9.4248	0.1056	0.0112	3.1416

## REPORT NO. NADC-EL-52195

$\frac{P}{r}$	$\frac{ds}{r}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
.000	.05	0.7756	0.6015	0.7413	0.6313	0.3985	2.3121
	.15	0.4248	0.1805	1.3184	0.9053	0.8195	2.8892
	.25	0.3549	0.1260	1.5708	0.9349	0.8740	3.1416
	.35	0.4248	0.1805	1.8232	0.9053	0.8195	3.3940
	.45	0.7756	0.6015	2.4003	0.6313	0.3985	3.9711
	.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	.55	0.7756	0.6015	3.8829	0.6313	0.3985	2.3121
	.65	0.4248	0.1805	4.4600	0.9053	0.8195	2.8892
	.75	0.3549	0.1260	4.7124	0.9349	0.8740	3.1416
	.85	0.4248	0.1805	4.9648	0.9053	0.8195	3.3940
	.95	0.7756	0.6015	5.5419	0.6313	0.3985	3.9711
	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	0.7756	0.6015	7.0245	0.6313	0.3985	2.3121
	1.15	0.4248	0.1805	7.6016	0.9053	0.8195	2.8892
	1.25	0.3549	0.1260	7.8540	0.9349	0.8740	3.1416
	1.35	0.4248	0.1805	8.1063	0.9053	0.8195	3.3940
	1.45	0.7756	0.6015	8.6835	0.6313	0.3985	3.9711
	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{p}{.005}$	$\frac{r}{.60}$	$\frac{d_s}{.05}$	$\frac{T_n}{.05}$	$\frac{T_n^2}{.05}$	$\frac{T_n}{.05}$	$\frac{R}{.05}$	$\frac{R^2}{.05}$	$\frac{R'}{.05}$
.005	.60	.05	.07745	.05999	.07403	.06304	.03975	2.3135
.015	.60	.05	.04243	.01800	1.3170	.09042	.08176	2.8895
.025	.60	.05	.03544	.01256	1.5708	.09336	.08716	3.1416
.035	.60	.05	.04236	.01735	1.8264	.09028	.08150	3.3932
.045	.60	.05	.07663	.05873	2.4039	.06239	.03893	3.0579
.050	.60	.05	.09783	.09571	3.1416	.00202	.00004	2.1416
.055	.60	.05	.07643	.05841	3.8724	.06224	.03873	2.3282
.065	.60	.05	.04225	.01786	4.4540	.0006	.08111	2.8906
.075	.60	.05	.03534	.01249	4.7124	.09310	.08668	3.1416
.085	.60	.05	.04219	.01780	4.9727	.08992	.08085	3.3922
.095	.60	.05	.07562	.05719	5.5597	.06163	.03798	3.9431
1.00	.60	.05	.09575	.09168	6.2832	.00396	.00016	3.1416
1.05	.60	.05	.07542	.05688	7.0048	.06148	.03780	2.3431
1.15	.60	.05	.04209	.01771	7.5910	.08971	.08047	2.8917
1.25	.60	.05	.03524	.01242	7.8540	.09284	.08620	3.1416
1.35	.60	.05	.04202	.01765	8.1188	.08957	.08022	3.3910
1.45	.60	.05	.07463	.05569	8.7104	.06091	.03710	2.9280
1.50	.60	.05	.09375	.08789	9.4248	.00582	.00034	3.1416

## REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan^2 \theta}{\epsilon - \sin^2 \theta}$$

$\frac{p}{\epsilon}$	$\frac{r}{\epsilon}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\epsilon}$	$\frac{T_n^2}{\epsilon}$	$\frac{T_n'}{\epsilon}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
.010	.69	0.05	0.7735	0.5983	0.7394	0.6296	0.3964	2.3150
		0.15	0.4238	0.1796	1.3156	0.9031	0.8156	2.8898
		0.25	0.3539	0.1253	1.5708	0.9323	0.8692	3.1416
		0.35	0.4224	0.1784	1.8297	0.9003	0.8105	3.3925
		0.45	0.7572	0.5734	2.4172	0.6170	0.3807	3.9445
		0.50	0.9575	0.9168	3.1416	0.0396	0.0016	3.1416
		0.55	0.7532	0.5673	3.8623	0.6141	0.3771	2.3446
		0.65	0.4203	0.1767	4.4480	0.8960	0.8028	2.8920
		0.75	0.3519	0.1238	4.7124	0.9271	0.8596	3.1416
		0.85	0.4189	0.1755	4.9804	0.8932	0.7978	3.3902
		0.95	0.7374	0.5438	5.5767	0.6031	0.3637	3.9143
		1.00	0.9183	0.8432	6.2832	0.0760	0.0058	3.1416
		1.05	0.7336	0.5381	6.9862	0.6005	0.3606	2.3749
		1.15	0.4168	0.1737	7.5805	0.8891	0.7904	2.8943
		1.25	0.3498	0.1223	7.8540	0.9221	0.8502	3.1416
		1.35	0.4153	0.1725	8.1311	0.8863	0.7856	3.3879
		1.45	0.7183	0.5160	8.7353	0.5910	0.3493	3.8837
		1.50	0.8819	0.7777	9.4248	0.1095	0.0120	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$$d_s = \frac{\pi}{\lambda} \sqrt{e - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.70}$	$\frac{d_s}{.05}$	$\frac{T_n}{.05}$	$\frac{T_n^2}{.05}$	$\frac{T_n}{.05}$	$\frac{R}{.05}$	$\frac{R^2}{.05}$	$\frac{R'}{.05}$
0.05	0.05	0.05	0.7626	0.5815	0.7594	0.6469	0.4185	2.3302
0.15	0.15	0.15	0.4106	0.1686	1.3271	0.9118	0.8314	2.8979
0.25	0.25	0.25	0.3423	0.1172	1.5708	0.9396	0.8828	3.1416
0.35	0.35	0.35	0.4106	0.1686	1.8145	0.9118	0.8314	3.3853
0.45	0.45	0.45	0.7626	0.5815	2.3822	0.6469	0.4185	3.9520
0.50	0.50	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55	0.55	0.55	0.7626	0.5815	3.9010	0.6469	0.4185	2.3302
0.65	0.65	0.65	0.4106	0.1686	4.4687	0.9118	0.8314	2.8979
0.75	0.75	0.75	0.3423	0.1172	4.7124	0.9396	0.8828	3.1416
0.85	0.85	0.85	0.4106	0.1686	4.9561	0.9118	0.8314	3.3853
0.95	0.95	0.95	0.7626	0.5815	5.5238	0.6469	0.4185	3.9520
1.00	1.00	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05	1.05	1.05	0.7626	0.5815	7.0426	0.6469	0.4185	2.3302
1.15	1.15	1.15	0.4106	0.1686	7.6102	0.9118	0.8314	2.8979
1.25	1.25	1.25	0.3423	0.1172	7.8540	0.9396	0.8828	3.1416
1.35	1.35	1.35	0.4106	0.1686	8.0977	0.9118	0.8314	3.3853
1.45	1.45	1.45	0.7626	0.5815	8.6654	0.6469	0.4185	3.9520
1.50	1.50	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{v \tan \beta}{e - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{e - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.005}$	$\frac{r}{.70}$	$\frac{d_s}{.05}$	$\frac{T_n}{.7616}$	$\frac{T_n^2}{.5800}$	$\frac{T_n}{1.3256}$	$\frac{R}{0.6460}$	$\frac{R^2}{0.4174}$	$\frac{R'}{2.3216}$
		0.15	0.4101	0.1682	1.3256	0.9108	0.8295	2.8981
		0.25	0.3418	0.1166	1.5708	0.9383	0.8805	3.1416
		0.35	0.4095	0.1677	1.8178	0.9094	0.8269	3.3846
		0.45	0.7535	0.5677	2.3912	0.6393	0.4088	3.9403
		0.50	0.9775	0.9556	3.1416	0.0211	0.0004	3.1416
		0.55	0.7515	0.5647	3.8900	0.6377	0.4067	2.3458
		0.65	0.4085	0.1669	4.4625	0.9073	0.8231	2.8991
		0.75	0.3409	0.1162	4.7124	0.9358	0.8758	3.1416
		0.85	0.4078	0.1663	4.9641	0.9059	0.8206	3.3836
		0.95	0.7435	0.5528	5.5425	0.6314	0.3987	3.9259
		1.00	0.9560	0.9140	6.2832	0.0412	0.0017	3.1416
		1.05	0.7415	0.5499	7.0219	0.6299	0.3968	2.3602
		1.15	0.4069	0.1655	7.5994	0.9038	0.8169	2.9002
		1.25	0.3399	0.1156	7.8540	0.9333	0.8711	3.1416
		1.35	0.4062	0.1650	8.1104	0.9024	0.8144	3.3826
		1.45	0.7337	0.5383	8.6936	0.6241	0.3895	3.9113
		1.50	0.9353	0.8749	9.4248	0.0605	0.0037	3.1416

## REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.010	0.70	0.05	0.7606	0.5784	0.7574	0.6452	0.4162	2.5330
		0.15	0.4096	0.1678	1.3242	0.9097	0.8276	2.8984
		0.25	0.3414	0.1165	1.5708	0.9371	0.8781	3.1416
		0.35	0.4083	0.1667	1.8211	0.9069	0.8225	3.3839
		0.45	0.7445	0.5543	2.4000	0.6322	0.3997	3.9273
		0.50	0.9560	0.9140	3.1416	0.0412	0.0017	3.1416
		0.55	0.7406	0.5484	3.8794	0.6292	0.3959	2.3617
		0.65	0.4064	0.1651	4.4564	0.9028	0.8150	2.9005
		0.75	0.3394	0.1152	4.7124	0.9321	0.8688	3.1416
		0.85	0.4051	0.1641	4.9720	0.9000	0.8101	3.3819
		0.95	0.7250	0.5255	5.5604	0.6179	0.3817	3.8980
		1.00	0.9135	0.8382	6.2832	0.0790	0.0062	3.1416
		1.05	0.7212	0.5201	7.0024	0.6152	0.3785	2.3911
		1.15	0.4030	0.1624	7.5888	0.8960	0.8028	2.9027
		1.25	0.3375	0.1139	7.8540	0.9271	0.8596	3.1416
		1.35	0.4017	0.1614	8.1228	0.8933	0.7980	3.3796
		1.45	0.7061	0.4985	8.7198	0.6034	0.3665	3.8682
		1.50	0.8781	0.7710	9.4248	0.1136	0.0129	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.71}$	$\frac{d_s}{.05}$	$\frac{T_n}{.7489}$	$\frac{T_n^2}{.5609}$	$\frac{T_n}{1.7781}$	$\frac{R}{0.6627}$	$\frac{R^2}{0.4391}$	$\frac{R'}{2.3489}$
		0.15	0.3963	0.1571	1.3357	0.9181	0.8429	2.9065
		0.25	0.3297	0.1087	1.5708	0.9441	0.8913	3.1416
		0.35	0.3963	0.1571	1.8059	0.9181	0.8429	3.3767
		0.45	0.7489	0.5609	2.3635	0.6627	0.4391	3.9343
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.7489	0.5609	3.9197	0.6627	0.4391	2.3489
		0.65	0.3963	0.1571	4.4773	0.9181	0.8429	2.9065
		0.75	0.3297	0.1087	4.7124	0.9441	0.8913	3.1416
		0.85	0.3963	0.1571	4.9475	0.9181	0.8429	3.3767
		0.95	0.7489	0.5609	5.5051	0.6627	0.4391	3.9343
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.7489	0.5609	7.0613	0.6627	0.4391	2.3489
		1.15	0.3963	0.1571	7.6189	0.9181	0.8429	2.9065
		1.25	0.3297	0.1087	7.8540	0.9441	0.8913	3.1416
		1.35	0.3963	0.1571	8.0891	0.9181	0.8429	3.3767
		1.45	0.7489	0.5609	8.6467	0.6627	0.4391	3.9343
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$$

$\frac{P}{.005}$	$\frac{r}{.71}$	$\frac{d_s}{.05}$	$\frac{T_n}{.71}$	$\frac{T_n^2}{.5594}$	$\frac{T_n}{.7770}$	$\frac{R}{.6618}$	$\frac{R^2}{.4380}$	$\frac{R'}{2.3503}$
		0.05	0.7479	0.5594	0.7770	0.6618	0.4380	2.3503
		0.15	0.3959	0.1567	1.3342	0.9171	0.8410	2.9068
		0.25	0.3293	0.1084	1.5708	0.9429	0.8890	3.1416
		0.35	0.3933	0.1562	1.8093	0.9157	0.8385	3.3761
		0.45	0.7400	0.5475	2.3729	0.6549	0.4289	3.9220
		0.50	0.9767	0.9539	3.1416	0.0220	0.0005	3.1416
		0.55	0.7380	0.5446	3.9082	0.6533	0.4268	2.3640
		0.65	0.3944	0.1555	4.4711	0.9137	0.8348	2.9077
		0.75	0.3284	0.1078	4.7124	0.9404	0.8844	3.1416
		0.85	0.3938	0.1551	4.9556	0.9123	0.8323	3.3751
		0.95	0.7301	0.5331	5.5248	0.6468	0.4184	3.9081
		1.00	0.9544	0.9109	6.2832	0.0429	0.0018	3.1416
		1.05	0.7282	0.5303	7.0396	0.6453	0.4164	2.3779
		1.15	0.3928	0.1543	7.6079	0.9103	0.8287	2.9086
		1.25	0.3275	0.1073	7.8540	0.9380	0.8799	3.1416
		1.35	0.3922	0.1538	8.1019	0.9090	0.8262	3.3742
		1.45	0.7205	0.5191	8.6763	0.6392	0.4086	3.8939
		1.50	0.9331	0.8706	9.4248	0.0630	0.0040	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$$d_s = \frac{K V e - \sin^2 \theta}{\lambda}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{e - \sin^2 \theta}$	$\frac{R^2}{e - \sin^2 \theta}$	$\frac{R'}{e - \sin^2 \theta}$
.010	.71	0.05	0.7469	0.5579	0.7760	0.6609	0.4368	2.3516
		0.15	0.3954	0.1564	1.3328	0.9161	0.8392	2.9070
		0.25	0.3288	0.1081	1.5708	0.9416	0.8867	3.1416
		0.35	0.3042	0.1554	2.5856	0.9133	0.8342	4.1484
		0.45	0.7211	0.5345	2.3821	0.6476	0.4194	3.9095
		0.50	0.9544	0.9109	3.1416	0.0429	0.0018	3.1416
		0.55	0.7272	0.5289	3.8970	0.6445	0.4154	2.3793
		0.65	0.3024	0.1540	4.4649	0.9093	0.8268	2.9089
		0.75	0.3271	0.1070	4.7124	0.9368	0.8776	3.1416
		0.85	0.3012	0.1530	4.9636	0.9066	0.8220	3.3735
		0.95	0.7119	0.5063	5.5434	0.6329	0.4005	3.8811
		1.00	0.9126	0.8328	6.2832	0.0821	0.0067	3.1416
		1.05	0.7081	0.5014	7.0191	0.6301	0.3971	2.4079
		1.15	0.3893	0.1515	7.5971	0.9027	0.8148	2.9110
		1.25	0.3252	0.1058	7.8540	0.9320	0.8687	3.1416
		1.35	0.3830	0.1505	8.1145	0.9001	0.8101	3.3714
		1.45	0.6932	0.4806	8.7037	0.5200	0.3845	3.8521
		1.50	0.8741	0.7640	9.4748	0.1180	0.0139	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$					
$\frac{P}{r}$	$\frac{r}{d_s}$	$\frac{T_n}{T_n}$	$\frac{R^2}{T_n}$	$\frac{T_n}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R}$	$\frac{R'}{R'}$
.000	.72	0.05	0.7345	0.5395	0.7975	0.6786	2.3683
		0.15	0.3820	0.1460	1.3443	0.9241	2.9151
		0.25	0.3172	0.1006	1.5708	0.9484	3.1416
		0.35	0.3820	0.1460	1.7973	0.9241	3.3681
		0.45	0.7345	0.5395	2.3441	0.6786	3.9149
		0.50	1.0000	1.0000	3.1416	0.0000	1.5704
		0.55	0.7345	0.5395	3.9391	0.6786	2.3683
		0.65	0.3820	0.1460	4.4859	0.9241	2.9151
		0.75	0.3172	0.1006	4.7124	0.9484	3.1416
		0.85	0.3820	0.1460	4.9389	0.9241	3.3681
		0.95	0.7345	0.5395	5.4857	0.6786	3.9149
		1.00	1.0000	1.0000	6.2832	0.0000	1.5708
		1.05	0.7345	0.5395	7.0806	0.6786	2.3683
		1.15	0.3820	0.1460	7.6275	0.9241	2.9151
		1.25	0.3172	0.1006	7.8540	0.9484	3.1416
		1.35	0.3820	0.1460	8.0805	0.9241	3.3681
		1.45	0.7345	0.5395	8.6273	0.6786	3.9149
		1.50	1.0000	1.0000	9.4248	0.0000	1.5704

## REPORT NO. NADC-EL-52195

$$d_s = \frac{x \sqrt{1 - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	F	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda^2}$	$\frac{R'}{\lambda}$
.005	.72	0.05	0.7335	0.5380	0.7963	0.6777	0.4593	2.3696
		0.15	0.3816	0.1456	1.3428	0.9231	0.8522	2.9154
		0.25	0.3168	0.1003	1.5708	0.9472	0.8972	3.1416
		0.35	0.3811	0.1452	1.8007	0.9218	0.8497	3.3675
		0.45	0.7257	0.5266	2.3540	0.6707	0.4498	3.5031
		0.50	0.9758	0.9522	3.1416	0.0229	0.0005	3.1416
		0.55	0.7238	0.5238	3.9270	0.6690	0.4476	2.3828
		0.65	0.3802	0.1446	4.4796	0.9198	0.8461	2.9162
		0.75	0.3160	0.0998	4.7124	0.9448	0.8927	3.1416
		0.85	0.3797	0.1441	4.9471	0.9185	0.8437	3.3666
		0.95	0.7161	0.5127	5.5064	0.6624	0.4388	3.8897
		1.00	0.9527	0.9076	6.2832	0.0447	0.0020	3.1416
		1.05	0.7142	0.5100	7.0579	0.6608	0.4367	2.3962
		1.15	0.3788	0.1435	7.6164	0.9166	0.8401	2.9171
		1.25	0.3152	0.0993	7.8540	0.9425	0.8883	3.1416
		1.35	0.3782	0.1431	8.0935	0.9152	0.8377	3.3657
		1.45	0.7066	0.4992	8.6584	0.6546	0.4285	3.8760
		1.50	0.9306	0.8660	9.4248	0.0656	0.0043	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin 2\theta}$$

$$ds = \frac{\kappa \sqrt{e - \sin 2\theta}}{\lambda}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.10	0.72	0.05	0.7325	0.5366	0.7952	0.6768	0.4581	2.3709
		0.15	0.3812	0.1453	1.3414	0.9221	0.8504	2.9156
		0.25	0.3164	0.1001	1.5708	0.9460	0.8949	3.1416
		0.35	0.3801	0.1445	1.8041	0.9195	0.8455	3.3659
		0.45	0.7170	0.5141	2.3637	0.6632	0.4398	3.8910
		0.50	0.9527	0.9076	3.1416	0.0447	0.0020	3.1416
		0.55	0.7132	0.5087	3.9153	0.6600	0.4356	2.3976
		0.65	0.3784	0.1432	4.4734	0.9156	0.8383	2.9174
		0.75	0.3147	0.0991	4.7124	0.9413	0.8861	3.1416
		0.85	0.3772	0.1423	4.9552	0.9130	0.8335	3.3650
		0.95	0.6981	0.4874	5.5260	0.6481	0.4200	3.8636
		1.00	0.9095	0.8271	6.2832	0.0854	0.0073	3.1416
		1.05	0.6044	0.4822	7.0364	0.6453	0.4164	2.4252
		1.15	0.3755	0.1410	7.6055	0.9091	0.8265	2.9193
		1.25	0.3130	0.0980	7.8540	0.9367	0.8774	3.1416
		1.35	0.3743	0.1401	8.1063	0.9066	0.8219	3.3631
		1.45	0.6798	0.4621	8.6871	0.6349	0.4031	3.8356
		1.50	0.8698	0.7565	9.4248	0.1226	0.0150	3.1416

## REPORT NO. NADC-EL-52195

$$d_s = \frac{\pi}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.73}$	$\frac{d_s}{.05}$	$\frac{T_n}{.7193}$	$\frac{T_n^2}{0.5173}$	$\frac{T_n}{0.7193}$	$\frac{T_n^2}{0.5173}$	$\frac{T_n}{0.7193}$	$\frac{R}{0.6947}$	$\frac{R^2}{0.4827}$	$\frac{R'}{2.3883}$
		0.05	0.7193	0.5173	0.7193	0.5173	0.8175	0.6947	0.4827	2.3883
		0.15	0.3677	0.1352	0.3677	0.1352	1.3529	0.9299	0.8648	2.9237
		0.25	0.3047	0.0929	0.3047	0.0929	1.5708	0.9524	0.9071	3.1416
		0.35	0.3677	0.1352	0.3677	0.1352	1.7887	0.9299	0.8648	3.3595
		0.45	0.7193	0.5173	0.7193	0.5173	2.3241	0.6947	0.4827	3.8949
		0.50	1.0000	1.0000	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.7193	0.5173	0.7193	0.5173	3.9591	0.6947	0.4827	2.3883
		0.65	0.3677	0.1352	0.3677	0.1352	4.4945	0.9299	0.8648	2.9237
		0.75	0.3047	0.0929	0.3047	0.0929	4.7124	0.9524	0.9071	3.1416
		0.85	0.3677	0.1352	0.3677	0.1352	4.9303	0.9299	0.8648	3.3595
		0.95	0.7193	0.5173	0.7193	0.5173	5.4657	0.6947	0.4827	3.8949
		1.00	1.0000	1.0000	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.7193	0.5173	0.7193	0.5173	7.1007	0.6947	0.4827	2.3883
		1.15	0.3677	0.1352	0.3677	0.1352	7.6361	0.9299	0.8648	2.9237
		1.25	0.3047	0.0929	0.3047	0.0929	7.8540	0.9524	0.9071	3.1416
		1.35	0.3677	0.1352	0.3677	0.1352	8.0719	0.9299	0.8648	3.3595
		1.45	0.7193	0.5173	0.7193	0.5173	8.6073	0.6947	0.4827	3.8949
		1.50	1.0000	1.0000	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.73}$	$\frac{ds}{.05}$	$\frac{T_n}{.05}$	$\frac{T_n^2}{.05}$	$\frac{T_n}{.05}$	$\frac{R}{.05}$	$\frac{R^2}{.05}$	$\frac{R'}{.05}$
0.05	0.73	0.05	0.7183	0.5160	0.8163	0.6938	0.4814	2.3895
0.15	0.3674	0.15	0.3674	0.1350	1.3514	0.9290	0.8630	2.9240
0.25	0.3044	0.25	0.3044	0.0926	1.5708	0.9513	0.9050	3.1416
0.35	0.3668	0.35	0.3668	0.1345	1.7921	0.9277	0.8606	3.3589
0.45	0.7107	0.45	0.7107	0.5051	2.3345	0.6866	0.4714	3.8835
0.50	0.9748	0.50	0.9748	0.9503	3.1416	0.0239	0.0006	3.1416
0.55	0.7088	0.55	0.7088	0.5024	3.9464	0.6849	0.4691	2.4022
0.65	0.3661	0.65	0.3661	0.1340	4.4881	0.9257	0.8570	2.9247
0.75	0.3036	0.75	0.3036	0.0922	4.7124	0.9490	0.9007	3.1416
0.85	0.3655	0.85	0.3655	0.1336	4.9386	0.9245	0.8546	3.3581
0.95	0.7013	0.95	0.7013	0.4918	5.4879	0.6781	0.4598	3.8706
1.00	0.9509	1.00	0.9509	0.9041	6.2832	0.0467	0.0022	3.1416
1.05	0.6994	1.05	0.6994	0.4891	7.0768	0.6765	0.4576	2.4152
1.15	0.3647	1.15	0.3647	0.1330	7.6248	0.9226	0.8511	2.9256
1.25	0.3028	1.25	0.3028	0.0917	7.8540	0.9468	0.8964	3.1416
1.35	0.3642	1.35	0.3642	0.1326	8.0851	0.9213	0.8488	3.3573
1.45	0.6919	1.45	0.6919	0.4788	8.6399	0.6702	0.4491	3.8575
1.50	0.9280	1.50	0.9280	0.8611	9.4248	0.0683	0.0047	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

		$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R'}{\lambda}$
.010	.73	0.05	0.7174	0.5146	0.8151	0.6929	2.3908
		0.15	0.3670	0.1347	1.3500	0.9280	2.9242
		0.25	0.3040	0.0924	1.5708	0.9502	3.1416
		0.35	0.3659	0.1339	1.7955	0.9254	3.3594
		0.45	0.7022	0.4931	2.3446	0.6789	3.8719
		0.50	0.9539	0.9041	3.1416	0.0467	3.1416
		0.55	0.6085	0.4878	3.9341	0.6757	2.4165
		0.65	0.3643	0.1327	4.4818	0.9216	2.9258
		0.75	0.3025	0.0915	4.7124	0.9457	3.1416
		0.85	0.3623	0.1320	4.9468	0.9191	3.3565
		0.95	0.6837	0.4674	5.5079	0.6634	3.8455
		1.00	0.9061	0.8210	6.2832	0.0890	3.1416
		1.05	0.6800	0.4624	7.0543	0.6606	2.4431
		1.15	0.3616	0.1308	7.6138	0.9153	2.9276
		1.25	0.3009	0.0905	7.8540	0.9412	3.1416
		1.35	0.3605	0.1300	8.0980	0.9129	3.3548
		1.45	0.6657	0.4431	8.6700	0.6499	3.8184
		1.50	0.8652	0.7486	9.4248	0.1275	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub> '	R	R <sup>2</sup>	R'
.000	.74	0.03	0.7033	0.4946	0.8382	0.7109	0.5054	2.4090
		0.15	0.3534	0.1249	1.3615	0.9355	0.8751	2.9323
		0.25	0.2923	0.0855	1.5708	0.9563	0.9145	3.1416
		0.35	0.3534	0.1249	1.7801	0.9355	0.8751	3.3509
		0.45	0.7033	0.4946	2.3034	0.7109	0.5054	3.8742
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.7033	0.4946	3.9798	0.7109	0.5054	2.4090
		0.65	0.3534	0.1249	4.5031	0.9355	0.8751	2.9323
		0.75	0.2923	0.0855	4.7124	0.9563	0.9145	3.1416
		0.85	0.3534	0.1249	4.9217	0.9355	0.8751	3.3509
		0.95	0.7033	0.4946	5.4450	0.7109	0.5054	3.8742
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.7033	0.4946	7.1213	0.7109	0.5054	2.4090
		1.15	0.3534	0.1249	7.6447	0.9355	0.8751	2.9323
		1.25	0.2923	0.0855	7.8540	0.9563	0.9145	3.1416
		1.35	0.3534	0.1249	8.0633	0.9355	0.8751	3.3509
		1.45	0.7033	0.4946	8.5866	0.7109	0.5054	3.8742
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.74}$	$\frac{ds}{.05}$	$\frac{T_n}{.7023}$	$\frac{T_n^2}{.4933}$	$\frac{T_n^3}{.8369}$	$\frac{R}{.7100}$	$\frac{R^2}{.5041}$	$\frac{R^3}{.24102}$
		0.05	0.7023	0.4933	0.8369	0.7100	0.5041	2.4102
		0.15	0.3531	0.1247	1.3600	0.9345	0.8733	2.9325
		0.25	0.2920	0.0853	1.5708	0.9552	0.9125	3.1416
		0.35	0.3526	0.1243	1.7836	0.9333	0.8710	3.3504
		0.45	0.6949	0.4829	2.3143	0.7027	0.4937	3.8533
		0.50	0.9733	0.9483	3.1416	0.0250	0.0006	3.1416
		0.55	0.6930	0.4803	3.9565	0.7009	0.4912	2.4223
		0.65	0.3519	0.1238	4.4967	0.9314	0.8675	2.9333
		0.75	0.2913	0.0849	4.7124	0.9530	0.9083	3.1416
		0.85	0.3514	0.1235	4.9301	0.9302	0.8652	3.3496
		0.95	0.6857	0.4702	5.4677	0.6940	0.4816	3.8510
		1.00	0.9489	0.9004	6.2832	0.0488	0.0024	3.1416
		1.05	0.6839	0.4677	7.0964	0.6923	0.4793	2.4347
		1.15	0.3507	0.1230	7.6353	0.9283	0.8618	2.9340
		1.25	0.2906	0.0844	7.8540	0.9509	0.9041	3.1416
		1.35	0.3502	0.1226	8.0766	0.9271	0.8595	3.3488
		1.45	0.6766	0.4578	8.6207	0.6858	0.4704	3.8384
		1.50	0.9252	0.8559	9.4248	0.0713	0.0051	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{.010}$	$\frac{r}{.74}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{T_2}$	$\frac{T_2^2}{T_3}$	$\frac{T_n}{T_3}$	$P = \frac{\epsilon \tan \delta}{1 - \sin^2 \theta}$	$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R}$
0.05		0.7014	0.4919	0.8357	0.7091	0.5028	2.4114		
0.15		0.3527	0.1244	1.3585	0.9336	0.8716	2.9328		
0.25		0.2916	0.0851	1.5708	0.9541	0.9104	3.1416		
0.35		0.3518	0.1237	1.7870	0.9311	0.8669	3.3498		
0.45		0.5866	0.4714	2.3249	0.6948	0.4828	3.8522		
0.50		0.9489	0.5004	3.1416	0.0488	0.0024	3.1416		
0.55		0.6829	0.4664	3.9536	0.6915	0.4782	2.4360		
0.65		0.3503	0.1227	4.4902	0.9274	0.8600	2.9343		
0.75		0.2902	0.0842	4.7124	0.9498	0.9021	3.1416		
0.85		0.3493	0.1220	4.9384	0.9249	0.8555	3.3483		
0.95		0.6685	0.4469	5.4892	0.6790	0.4610	3.8268		
1.00		0.9025	0.8146	6.2932	0.0928	0.0086	3.1416		
1.05		0.6649	0.4422	7.0728	0.6760	0.4570	2.4615		
1.15		0.3478	0.1209	7.6221	0.9213	0.8488	2.9359		
1.25		0.2888	0.0834	7.9540	0.9455	0.8939	3.1416		
1.35		0.3467	0.1202	8.0897	0.9189	0.8444	3.3465		
1.45		0.6509	0.4236	8.6523	0.6651	0.4424	3.8007		
1.50		0.8603	0.7401	9.4248	0.1327	0.0176	3.1416		

## REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$T_n^2$		$T_n$		$R$		$R^2$		$R'$	
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$	$\frac{R'}{\lambda}$
0.00	0.75	0.05	0.6864	0.4711	0.8595	0.8595	0.8595	0.7272	0.7272	0.5289	0.5289	2.4303	2.4303
		0.15	0.3392	0.1150	1.3701	1.3701	1.3701	0.9407	0.9407	0.8850	0.8850	2.9409	2.9409
		0.25	0.2800	0.0784	1.5708	1.5708	1.5708	0.9600	0.9600	0.9216	0.9216	3.1416	3.1416
		0.35	0.3392	0.1150	1.7715	1.7715	1.7715	0.9407	0.9407	0.8850	0.8850	3.3423	3.3423
		0.45	0.6864	0.4711	2.2821	2.2821	2.2821	0.7272	0.7272	0.5289	0.5289	3.8529	3.8529
		0.50	1.0000	1.0000	3.1416	3.1416	3.1416	0.0000	0.0000	0.0000	0.0000	1.5708	1.5708
		0.55	0.6864	0.4711	4.0011	4.0011	4.0011	0.7272	0.7272	0.5289	0.5289	2.4303	2.4303
		0.65	0.3392	0.1150	4.5117	4.5117	4.5117	0.9407	0.9407	0.8850	0.8850	2.9409	2.9409
		0.75	0.2800	0.0784	4.7124	4.7124	4.7124	0.9600	0.9600	0.9216	0.9216	3.1416	3.1416
		0.85	0.3392	0.1150	4.9131	4.9131	4.9131	0.9407	0.9407	0.8850	0.8850	3.3423	3.3423
		0.95	0.6864	0.4711	5.4237	5.4237	5.4237	0.7272	0.7272	0.5289	0.5289	3.8529	3.8529
		1.00	1.0000	1.0000	6.2832	6.2832	6.2832	0.0000	0.0000	0.0000	0.0000	1.5708	1.5708
		1.05	0.6864	0.4711	7.1427	7.1427	7.1427	0.7272	0.7272	0.5289	0.5289	2.4303	2.4303
		1.15	0.3392	0.1150	7.6533	7.6533	7.6533	0.9407	0.9407	0.8850	0.8850	2.9409	2.9409
		1.25	0.2800	0.0784	7.8540	7.8540	7.8540	0.9600	0.9600	0.9216	0.9216	3.1416	3.1416
		1.35	0.3392	0.1150	8.0547	8.0547	8.0547	0.9407	0.9407	0.8850	0.8850	3.3423	3.3423
		1.45	0.6864	0.4711	8.5653	8.5653	8.5653	0.7272	0.7272	0.5289	0.5289	3.8529	3.8529
		1.50	1.0000	1.0000	9.4248	9.4248	9.4248	0.0000	0.0000	0.0000	0.0000	1.5708	1.5708

## REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$				
$\frac{P}{.005}$	$\frac{r}{.75}$	$\frac{d_s}{.05}$	$\frac{T_n}{.05}$	$\frac{T_n^2}{.05}$	$\frac{T'_n}{.05}$	$\frac{R}{.05}$	$\frac{R^2}{.05}$	$\frac{R'}{.05}$
.005	.75	.05	0.6855	0.4699	0.8582	0.7263	0.5275	2.4315
		.15	0.3388	0.1148	1.3686	0.9398	0.8833	2.9411
		.25	0.2797	0.0782	1.5708	0.9589	0.9196	3.1416
		.35	0.3384	0.1145	1.7750	0.9386	0.8810	3.2418
		.45	0.6783	0.4600	2.2934	0.7188	0.5167	3.8425
		.50	0.9777	0.9461	3.1416	0.0262	0.0007	3.1416
		.55	0.6765	0.4576	3.9873	0.7170	0.5141	2.4430
		.65	0.3377	0.1140	4.5052	0.3368	0.6776	2.9418
		.75	0.2791	0.0779	4.7124	0.9568	0.9156	3.1416
		.85	0.3373	0.1137	4.9216	0.9356	0.8754	3.3411
		.95	0.6693	0.4480	5.4474	0.7100	0.5040	3.8307
		1.00	0.9468	0.8964	6.2832	0.0510	0.0026	3.1416
		1.05	0.6675	0.4456	7.1166	0.7083	0.5016	2.4549
		1.15	0.3366	0.1133	7.6418	0.9338	0.8720	2.9425
		1.25	0.2784	0.0775	7.8540	0.9548	0.9116	3.1416
		1.35	0.3361	0.1130	8.0682	0.9326	0.8698	3.3404
		1.45	0.6605	0.4362	8.6009	0.7017	0.4923	3.8186
		1.50	0.9221	0.8503	9.4248	0.0745	0.0056	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$					$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$			
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n''}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.010	.75	0.05	0.6846	0.4687	0.8570	0.7253	0.5261	2.4326
		0.15	0.3385	0.1146	1.3671	0.9389	0.8816	2.9413
		0.25	0.2794	0.0781	1.5708	0.9579	0.9176	3.1416
		0.35	0.3376	0.1140	1.7785	0.9365	0.8770	3.3413
		0.45	0.6702	0.4492	2.3045	0.7108	0.5053	3.8319
		0.50	0.9468	0.8964	3.1416	0.0510	0.0026	3.1416
		0.55	0.6667	0.4444	3.9738	0.7074	0.5004	2.4561
		0.65	0.3362	0.1131	4.4987	0.9329	0.8704	2.9427
		0.75	0.2781	0.0773	4.7124	0.9537	0.9096	3.1416
		0.85	0.3353	0.1124	4.9301	0.9306	0.8660	3.3399
		0.95	0.6526	0.4259	5.4699	0.6945	0.4825	3.8075
		1.00	0.8987	0.8077	6.2832	0.0968	0.0094	3.1416
		1.05	0.6491	0.4214	7.0919	0.6916	0.4784	2.4806
		1.15	0.3339	0.1115	7.6304	0.9271	0.8594	2.9443
		1.25	0.2767	0.0766	7.8540	0.9426	0.9017	3.1416
		1.35	0.3329	0.1108	8.0815	0.9247	0.8551	3.3383
		1.45	0.6354	0.4037	8.6340	0.6805	0.4630	3.7824
		1.50	0.8551	0.7312	9.4248	0.1382	0.0191	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$p = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$\frac{p}{.000}$	$\frac{r}{.76}$	$\frac{ds}{.05}$	$\frac{T_H}{.6687}$	$\frac{T_H^2}{.4471}$	$\frac{T_H'}{.8816}$	$\frac{R}{.7436}$	$\frac{R^2}{.5529}$	$\frac{R'}{2.4524}$
		0.05	0.6687	0.4471	0.8816	0.7436	0.5529	2.4524
		0.15	0.3249	0.1055	1.3787	0.9458	0.8945	2.9495
		0.25	0.2677	0.0717	1.5708	0.9635	0.9283	3.1416
		0.35	0.3249	0.1055	1.7629	0.9458	0.8945	3.3337
		0.45	0.6687	0.4471	2.2600	0.7436	0.5529	3.8308
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.6687	0.4471	4.0232	0.7436	0.5529	2.4524
		0.65	0.3249	0.1055	4.5203	0.9458	0.8945	2.9495
		0.75	0.2677	0.0717	4.7124	0.9635	0.9283	3.1416
		0.85	0.3249	0.1055	4.9045	0.9458	0.8945	3.3337
		0.95	0.6687	0.4471	5.4016	0.7436	0.5529	3.8308
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.6687	0.4471	7.1648	0.7436	0.5529	2.4524
		1.15	0.3249	0.1055	7.6619	0.9458	0.8945	2.9495
		1.25	0.2677	0.0717	7.8540	0.9635	0.9283	3.1416
		1.35	0.3249	0.1055	8.0461	0.9458	0.8945	3.3337
		1.45	0.6687	0.4471	8.5432	0.7436	0.5529	3.8308
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$				
$\frac{P}{.005}$	$\frac{r}{.75}$	$\frac{ds}{.05}$	$\frac{T_n}{.6678}$	$\frac{T_n^2}{.4459}$	$\frac{T_n}{.8802}$	$\frac{R}{.7426}$	$\frac{R^2}{.5514}$	$\frac{R'}{2.4534}$
0.15		0.15	0.3246	0.1053	1.3771	0.9449	0.8928	2.9496
0.25		0.25	0.2675	0.0715	1.5708	0.9625	0.9254	3.1416
0.35		0.35	0.3242	0.1051	1.7665	0.9437	0.8906	3.3333
0.45		0.45	0.6603	0.4367	2.2719	0.7350	0.5402	3.8210
0.50		0.50	0.9715	0.9438	3.1416	0.0275	0.0008	3.1416
0.55		0.55	0.6591	0.4344	4.0087	0.7332	0.5375	2.4645
0.65		0.65	0.3235	0.1047	4.5136	0.9420	0.8873	2.9503
0.75		0.75	0.2669	0.0712	4.7124	0.9605	0.9225	3.1416
0.85		0.85	0.3231	0.1044	4.9132	0.9408	0.8851	3.3327
0.95		0.95	0.6521	0.4253	5.4264	0.7260	0.5271	3.8097
1.00		1.00	0.9445	0.8920	6.2832	0.0534	0.0029	3.1416
1.05		1.05	0.6504	0.4230	7.1374	0.7243	0.5246	2.4758
1.15		1.15	0.3225	0.1040	7.6502	0.9391	0.8819	2.9509
1.25		1.25	0.2663	0.0709	7.8540	0.9585	0.9186	3.1416
1.35		1.35	0.3221	0.1037	8.0598	0.9379	0.8797	3.3320
1.45		1.45	0.6436	0.4142	8.5805	0.7176	0.5149	3.7982
1.50		1.50	0.9189	0.8443	9.4248	0.0779	0.0061	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$				$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$				
$\frac{P}{.010}$	$\frac{r}{.75}$	$\frac{ds}{.05}$	$\frac{T_n}{.05669}$	$\frac{T_n^2}{0.4448}$	$\frac{T'_n}{0.8789}$	$\frac{R}{0.7416}$	$\frac{R^2}{0.5500}$	$\frac{R'}{2.4545}$
		0.15	0.3243	0.1051	1.3756	0.9440	0.8912	2.9499
		0.25	0.2672	0.0714	1.5708	0.9615	0.9244	3.1416
		0.35	0.3234	0.1046	1.7700	0.9417	0.8868	3.3328
		0.45	0.6530	0.4264	2.2835	0.7269	0.5284	3.8108
		0.50	0.9445	0.8920	3.1416	0.0534	0.0029	3.1416
		0.55	0.6496	0.4219	3.5946	0.7234	0.5234	2.4769
		0.65	0.3222	0.1038	4.5071	0.9382	0.8803	2.9511
		0.75	0.2650	0.0708	4.7124	0.9574	0.9167	3.1416
		0.85	0.3213	0.1032	4.9217	0.9359	0.8760	3.3315
		0.95	0.6359	0.4044	5.4499	0.7104	0.5047	3.7875
		1.00	0.8946	0.8003	6.2832	0.1011	0.0102	3.1416
		1.05	0.6325	0.4001	7.1116	0.7074	0.5004	2.5004
		1.15	0.3200	0.1024	7.6387	0.9326	0.8697	2.9526
		1.25	0.2648	0.0701	7.8540	0.9535	0.9091	3.1416
		1.35	0.3191	0.1018	8.0732	0.9303	0.8655	3.3300
		1.45	0.6192	0.3834	8.6151	0.6960	0.4844	3.7635
		1.50	0.8493	0.7216	9.4248	0.1441	0.0208	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{p}{.000}$	$\frac{r}{.77}$	$\frac{d_s}{.05}$	$\frac{T_n}{.6501}$	$\frac{T_n^2}{.4226}$	$\frac{T_n}{.9043}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{.5774}$	$\frac{R'}{2.4751}$
0.05		0.05	0.6501	0.4226	0.9043	0.7599	0.5774	2.4751
0.15		0.15	0.3106	0.0965	1.3872	0.9505	0.9035	2.9580
0.25		0.25	0.2556	0.0653	1.5708	0.9668	0.9347	3.1416
0.35		0.35	0.3106	0.0965	1.7544	0.9505	0.9035	3.3252
0.45		0.45	0.6501	0.4226	2.2373	0.7599	0.5774	3.8081
0.50		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55		0.55	0.6501	0.4226	4.0459	0.7599	0.5774	2.4751
0.65		0.65	0.3106	0.0965	4.5288	0.9505	0.9035	2.9580
0.75		0.75	0.2556	0.0653	4.7124	0.9668	0.9347	3.1416
0.85		0.85	0.3106	0.0965	4.6960	0.9505	0.9035	3.3252
0.95		0.95	0.6501	0.4226	5.3789	0.7599	0.5774	3.8081
1.00		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05		1.05	0.6501	0.4226	7.1875	0.7599	0.5774	2.4751
1.15		1.15	0.3106	0.0965	7.6704	0.9505	0.9035	2.9580
1.25		1.25	0.2556	0.0653	7.8540	0.9668	0.9347	3.1416
1.35		1.35	0.3106	0.0965	8.0376	0.9505	0.9035	3.3252
1.45		1.45	0.6501	0.4226	8.5205	0.7599	0.5774	3.8081
1.50		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.77}$	$\frac{ds}{.05}$	$\frac{T_n}{.6492}$	$\frac{T_n^2}{.4215}$	$\frac{T_n}{1.3857}$	$\frac{R}{.9497}$	$\frac{R^2}{.9019}$	$\frac{R'}{2.4761}$
		0.05	0.6492	0.4215	0.9029	0.7589	0.5759	2.4761
		0.15	0.3103	0.0963	1.3857	0.9497	0.9019	2.9582
		0.25	0.2553	0.0652	1.5708	0.9658	0.9328	3.1416
		0.35	0.3099	0.0961	1.7580	0.9486	0.8998	3.3248
		0.45	0.6425	0.4128	2.2497	0.7512	0.5643	3.7988
		0.50	0.9702	0.9412	3.1416	0.0288	0.0008	3.1416
		0.55	0.6408	0.4106	4.0308	0.7494	0.5616	2.4865
		0.65	0.3094	0.0957	4.5221	0.9469	0.8966	2.9587
		0.75	0.2548	0.0649	4.7124	0.9639	0.9291	3.1416
		0.85	0.3090	0.0955	4.9047	0.9458	0.8945	3.3242
		0.95	0.6341	0.4021	5.4048	0.7421	0.5508	3.7881
		1.00	0.9420	0.8873	6.2832	0.0560	0.0031	3.1416
		1.05	0.6325	0.4000	7.1590	0.7404	0.5481	2.4973
		1.15	0.3084	0.0951	7.6586	0.9441	0.8914	2.9593
		1.25	0.2542	0.0646	7.8540	0.9620	0.9254	3.1416
		1.35	0.3080	0.0949	8.0514	0.9430	0.8893	3.3236
		1.45	0.6258	0.3917	8.5595	0.7336	0.5381	3.7771
		1.50	0.9153	0.8379	9.4248	0.0816	0.0067	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n'}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
.010	.77	0.05	0.6484	0.4204	0.9015	0.7579	0.5745	2.4771
		0.15	0.3100	0.0961	1.3841	0.9489	0.9003	2.9533
		0.25	0.2551	0.0651	1.5708	0.9649	0.9309	3.1416
		0.35	0.3093	0.0957	1.7616	0.9466	0.8961	3.3244
		0.45	0.6350	0.4032	2.2618	0.7430	0.5521	3.7892
		0.50	0.9420	0.8873	3.1416	0.0560	0.0031	3.1416
		0.55	0.6316	0.3989	4.0160	0.7395	0.5469	2.4984
		0.65	0.3081	0.0949	4.5155	0.9433	0.8898	2.9595
		0.75	0.2540	0.0645	4.7124	0.9610	0.9235	3.1416
		0.85	0.3073	0.0945	4.9133	0.9411	0.8857	3.3231
		0.95	0.6184	0.3825	5.4294	0.7263	0.5275	3.7670
		1.00	0.8901	0.7923	6.2832	0.1058	0.0112	3.1416
		1.05	0.6152	0.3784	7.1320	0.7232	0.5230	2.5207
		1.15	0.3061	0.0937	7.6470	0.9378	0.8795	2.9608
		1.25	0.2528	0.0639	7.8540	0.9572	0.9162	3.1416
		1.35	0.3053	0.0932	8.0650	0.9357	0.8755	3.3218
		1.45	0.6022	0.3627	8.5956	0.7116	0.5064	3.7440
		1.50	0.8435	0.7115	9.4248	0.1504	0.0226	3.1416

REPORT NO. NADC-EL-52195

$\frac{p}{r}$	$\frac{r}{d_s}$	$\frac{d_s}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$P = \frac{e \tan^2 \theta}{e - \sin^2 \theta}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
0.00	0.78	0.05	0.6305	0.3976	0.9277	0.7762	0.6024	2.4985
		0.15	0.2963	0.0878	1.3957	0.9551	0.9122	2.9665
		0.25	0.2435	0.0593	1.5708	0.9699	0.9407	3.1416
		0.35	0.2963	0.0878	1.7459	0.9551	0.9122	3.3167
		0.45	0.6305	0.3976	2.2139	0.7762	0.6024	3.7847
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.6305	0.3976	4.0693	0.7762	0.6024	2.4985
		0.65	0.2963	0.0878	4.5373	0.9551	0.9122	2.9665
		0.75	0.2435	0.0593	4.7124	0.9699	0.9407	3.1416
		0.85	0.2963	0.0878	4.8875	0.9551	0.9122	3.3167
		0.95	0.6305	0.3976	5.3555	0.7762	0.6024	3.7847
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.6305	0.3976	7.2109	0.7762	0.6024	2.4985
		1.15	0.2963	0.0878	7.6789	0.9551	0.9122	2.9665
		1.25	0.2435	0.0593	7.8540	0.9699	0.9407	3.1416
		1.35	0.2963	0.0878	8.0291	0.9551	0.9122	3.3167
		1.45	0.6305	0.3976	8.4971	0.7762	0.6024	3.7847
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52135

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$$d_g = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_g}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$
0.05	.78	0.05	0.6297	0.3965	0.9263	0.7752	0.6009	2.4995
		0.15	0.2961	0.0877	1.3942	0.9543	0.9106	2.9667
		0.25	0.2432	0.0592	1.5708	0.9690	0.9389	3.1416
		0.35	0.2958	0.0875	1.7495	0.9532	0.9086	3.3163
		0.45	0.6233	0.3884	2.2268	0.7674	0.5890	3.7759
		0.50	0.9687	0.9384	3.1416	0.0303	0.0009	3.1416
		0.55	0.6216	0.3864	4.0535	0.7656	0.5861	2.5093
		0.65	0.2952	0.0872	4.5306	0.9516	0.9055	2.9672
		0.75	0.2428	0.0589	4.7124	0.9671	0.9353	3.1416
		0.85	0.2949	0.0870	4.8963	0.9505	0.9035	3.3158
		0.95	0.6152	0.3785	5.3825	0.7582	0.5749	3.7658
		1.00	0.9393	0.8823	6.2832	0.0588	0.0035	3.1416
		1.05	0.6136	0.3765	7.1811	0.7565	0.5722	2.5195
		1.15	0.2944	0.0866	7.6670	0.9489	0.9004	2.9677
		1.25	0.2423	0.0587	7.8540	0.9653	0.9318	3.1416
		1.35	0.2940	0.0864	8.0430	0.9479	0.8984	3.3152
		1.45	0.6073	0.3688	8.5377	0.7496	0.5618	3.7554
		1.50	0.9115	0.8309	9.4248	0.0856	0.0073	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-62195

$$d_s = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.78}$	$\frac{d_s}{.05}$	$\frac{T_n}{.6289}$	$\frac{T_n^2}{.3955}$	$\frac{T_n}{1.7531}$	$\frac{R}{.7742}$	$\frac{R^2}{.5994}$	$\frac{R'}{2.5003}$
		0.05	0.6289	0.3955	0.9248	0.7742	0.5994	2.5003
		0.15	0.2958	0.0875	1.3926	0.9535	0.9091	2.9668
		0.25	0.2430	0.0590	1.5708	0.9681	0.9371	3.1416
		0.35	0.2952	0.0871	1.7531	0.9513	0.9050	3.3159
		0.45	0.6160	0.3795	2.2395	0.7591	0.5763	3.7668
		0.50	0.9393	0.8823	3.1416	0.0588	0.0035	3.1416
		0.55	0.6128	0.3756	4.0382	0.7556	0.5709	2.5205
		0.65	0.2941	0.0865	4.5239	0.9481	0.8989	2.9679
		0.75	0.2420	0.0585	4.7124	0.9644	0.9300	3.1416
		0.85	0.2934	0.0861	4.9050	0.9460	0.8949	3.3148
		0.95	0.6001	0.3601	5.4082	0.7422	0.5509	3.7458
		1.00	0.8853	0.7838	6.2832	0.1108	0.0123	3.1416
		1.05	0.5970	0.3564	7.1530	0.7391	0.5462	2.5417
		1.15	0.2923	0.0854	7.6553	0.9429	0.8890	2.9691
		1.25	0.2410	0.0581	7.8540	0.9607	0.9230	3.1416
		1.35	0.2915	0.0850	8.0567	0.9408	0.8851	3.3135
		1.45	0.5845	0.3416	8.5755	0.7273	0.5290	3.7239
		1.50	0.8370	0.7006	9.4248	0.1572	0.0247	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{\lambda}{\sqrt{\epsilon - \sin^2 \theta}}$$

$\frac{P}{.000}$	$\frac{r}{.79}$	$\frac{d_s}{.05}$	$\frac{T_n}{.6100}$	$\frac{T_n^2}{.3722}$	$\frac{T_n^2}{.3722}$	$\frac{T_n}{.6100}$	$\frac{R}{.7924}$	$\frac{R^2}{.6278}$	$\frac{R'}{2.5226}$
.000	.79	.05	.6100	.3722	.3722	.6100	.7924	.6278	2.5226
		.15	.2821	.0796	.0796	.2821	.9594	.9204	2.9750
		.25	.2315	.0536	.0536	.2315	.9728	.9464	3.1416
		.35	.2821	.0796	.0796	.2821	.9594	.9204	3.3082
		.45	.6100	.3722	.3722	.6100	.7924	.6278	3.7605
		.50	1.0000	1.0000	1.0000	1.0000	.0000	.0000	1.5708
		.55	.6100	.3722	.3722	.6100	.7924	.6278	2.5226
		.65	.2821	.0796	.0796	.2821	.9594	.9204	2.9750
		.75	.2315	.0536	.0536	.2315	.9728	.9464	3.1416
		.85	.2821	.0796	.0796	.2821	.9594	.9204	3.3082
		.95	.6100	.3722	.3722	.6100	.7924	.6278	3.7605
		1.00	1.0000	1.0000	1.0000	1.0000	.0000	.0000	1.5708
		1.05	.6100	.3722	.3722	.6100	.7924	.6278	2.5226
		1.15	.2821	.0796	.0796	.2821	.9594	.9204	2.9750
		1.25	.2315	.0536	.0536	.2315	.9728	.9464	3.1416
		1.35	.2821	.0796	.0796	.2821	.9594	.9204	3.3082
		1.45	.6100	.3722	.3722	.6100	.7924	.6278	3.7605
		1.50	1.0000	1.0000	1.0000	1.0000	.0000	.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin 2\theta}$$

$$ds = \frac{\lambda}{\lambda} \sqrt{e - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.70}$	$\frac{ds}{.05}$	$\frac{T_n}{.06093}$	$\frac{T_n^2}{.03712}$	$\frac{T_n}{0.9505}$	$\frac{R}{0.7914}$	$\frac{R^2}{0.6263}$	$\frac{R'}{2.5235}$
0.15	0.2819	0.0795	0.0795	1.4026	0.9586	0.9189	2.9751	
0.25	0.2312	0.0535	0.0535	1.5708	0.9720	0.9447	3.1416	
0.35	0.2816	0.0793	0.0793	1.7411	0.9576	0.9169	3.3079	
0.45	0.6031	0.3638	0.3638	2.2033	0.7836	0.6140	3.7523	
0.50	0.9672	0.9354	0.9354	3.1416	0.0319	0.0010	3.1416	
0.55	0.5016	0.2619	0.2619	4.0770	0.7817	0.6110	2.5328	
0.65	0.2811	0.0790	0.0790	4.5390	0.9560	0.9140	2.9756	
0.75	0.2308	0.0533	0.0533	4.7124	0.9702	0.9413	3.1416	
0.85	0.2808	0.0789	0.0789	4.8879	0.9550	0.9120	3.3074	
0.95	0.5954	0.3545	0.3545	5.3595	0.7743	0.5996	3.7428	
1.00	0.9363	0.8767	0.8767	6.2832	0.0618	0.0038	3.1416	
1.05	0.5939	0.3527	0.3527	7.2040	0.7725	0.5968	2.5423	
1.15	0.2803	0.0786	0.0786	7.6754	0.9535	0.9091	2.9761	
1.25	0.2304	0.0531	0.0531	7.8540	0.9684	0.9379	3.1416	
1.35	0.2800	0.0784	0.0784	8.0347	0.9525	0.9072	3.3069	
1.45	0.5878	0.3455	0.3455	8.5154	0.7656	0.5861	3.7330	
1.50	0.9074	0.8233	0.8233	9.4248	0.0899	0.0081	3.1416	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{P}{r}$	$\frac{ds}{r}$	$\frac{ds}{\lambda} = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
.010	.79	0.05	0.6085	0.3703	0.9488	0.7904	0.6247	2.5244
		0.15	0.2817	0.0793	1.4010	0.9578	0.9174	2.9753
		0.25	0.2310	0.0534	1.5708	0.9711	0.9430	3.1416
		0.35	0.2810	0.0790	1.7447	0.9558	0.9135	3.3075
		0.45	0.5962	0.3555	2.2165	0.7752	0.6010	3.7438
		0.50	0.9363	0.8767	3.1416	0.0618	0.0038	3.1416
		0.55	0.5932	0.3518	4.0610	0.7716	0.5954	2.5433
		0.65	0.2801	0.0784	4.5322	0.9527	0.9076	2.9763
		0.75	0.2301	0.0530	4.7124	0.9676	0.9362	3.1416
		0.85	0.2794	0.0781	4.8967	0.9507	0.9038	3.3065
		0.95	0.5810	0.3375	5.3863	0.7581	0.5748	3.7239
		1.00	0.8801	0.7746	6.2832	0.1162	0.0135	3.1416
		1.05	0.5780	0.3340	7.1745	0.7550	0.5700	2.5633
		1.15	0.2784	0.0775	7.6635	0.9477	0.8981	2.9774
		1.25	0.2292	0.0525	7.8540	0.9641	0.9295	3.1416
		1.35	0.2777	0.0771	8.0485	0.9457	0.8943	3.3053
		1.45	0.5659	0.3203	8.5547	0.7430	0.5521	3.7031
		1.50	0.8300	0.6889	9.4248	0.1645	0.0270	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{x}{.80}$	$\frac{ds}{.05}$	$\frac{T_n}{.5886}$	$\frac{T_n^2}{.3465}$	$\frac{T_n}{1.4126}$	$\frac{R}{.8084}$	$\frac{R^2}{.6535}$	$\frac{R''}{2.5474}$
		0.15	0.2679	0.0718	1.4126	0.9634	0.9282	2.9834
		0.25	0.2195	0.0482	1.5708	0.9756	0.9518	3.1416
		0.35	0.2679	0.0718	1.7289	0.9634	0.9282	3.2997
		0.45	0.5886	0.3465	2.1649	0.8084	0.6535	3.7357
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.5886	0.3465	4.1182	0.8084	0.6535	2.5474
		0.65	0.2679	0.0718	4.5542	0.9634	0.9282	2.9834
		0.75	0.2195	0.0482	4.7124	0.9756	0.9518	3.1416
		0.85	0.2679	0.0718	4.8705	0.9634	0.9282	3.2997
		0.95	0.5886	0.3465	5.3065	0.8084	0.6535	3.7357
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.5886	0.3465	7.2598	0.8084	0.6535	2.5474
		1.15	0.2679	0.0718	7.6958	0.9634	0.9282	2.9834
		1.25	0.2195	0.0482	7.8540	0.9756	0.9518	3.1416
		1.35	0.2679	0.0718	8.0121	0.9634	0.9282	3.2997
		1.45	0.5886	0.3465	8.4481	0.8084	0.6535	3.7357
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## Aeronautical Electronic and Electrical Laboratory

**REPORT NO. NADC-EL-52195**

$\frac{P}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n}$	$\frac{R}{R^2}$	$\frac{R'}{R^2}$
0.005	0.05	0.5879	0.3456	0.8074	2.5483
	0.15	0.2677	0.0717	0.9627	2.9936
	0.25	0.2193	0.0481	0.9748	3.1416
	0.35	0.2675	0.0715	0.9617	3.2995
	0.45	0.5821	0.3386	0.7996	3.7281
	0.50	0.9654	0.9321	0.0337	3.1416
	0.55	0.5906	0.3371	0.7977	2.5483
	0.65	0.2670	0.0713	0.9602	2.9920
	0.75	0.2189	0.0479	0.9731	3.1416
	0.85	0.2667	0.0712	0.9593	3.2990
	0.95	0.5748	0.3304	0.7903	3.7102
	1.00	0.9331	0.9707	0.0651	3.1416
	1.05	0.5733	0.3287	0.7885	2.5483
	1.15	0.2663	0.0709	0.9578	2.9945
	1.25	0.2185	0.0478	0.9714	3.1416
	1.35	0.2660	0.0708	0.9568	3.2985
	1.45	0.5675	0.3220	0.7815	3.7100
	1.50	0.9028	0.8151	0.0946	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \beta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.20}$	$\frac{ds}{.05}$	$\frac{T_n}{.5872}$	$\frac{T_n^2}{.3448}$	$\frac{T_n}{.9735}$	$\frac{R}{.8064}$	$\frac{R^3}{.6503}$	$\frac{R'}{2.5491}$
		0.05	0.5872	0.3448	0.9735	0.8064	0.6503	2.5491
		0.15	0.2675	0.0716	1.4095	0.9670	0.9254	2.9837
		0.25	0.2191	0.0480	1.5708	0.9739	0.9485	3.1416
		0.35	0.2570	0.0713	1.7363	0.9600	0.9216	3.2991
		0.45	0.5755	0.3312	2.1928	0.7912	0.6250	3.7201
		0.50	0.5331	0.8707	3.1416	0.0651	0.0042	3.1416
		0.55	0.5726	0.3278	4.0844	0.7875	0.6203	2.5667
		0.65	0.2661	0.0708	4.5406	0.9571	0.9160	2.9846
		0.75	0.2183	0.0477	4.7124	0.9706	0.9420	3.1416
		0.85	0.2655	0.0705	4.8834	0.9551	0.9123	3.2982
		0.95	0.5610	0.3147	5.3638	0.7740	0.5991	3.7014
		1.00	0.8744	0.7646	6.2832	0.1221	0.0149	3.1416
		1.05	0.5581	0.3115	7.1969	0.7708	0.5942	2.5856
		1.15	0.2646	0.0700	7.6718	0.9522	0.9068	2.9856
		1.25	0.2175	0.0473	7.8540	0.9673	0.9356	3.1416
		1.35	0.2639	0.0697	8.0403	0.9503	0.9031	3.2971
		1.45	0.5456	0.2988	8.5334	0.7588	0.5758	3.6818
		1.50	0.8225	0.6764	9.4248	0.1723	0.0297	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

P	r	$\frac{ds}{ds}$	$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$		$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$		$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R'}$
			$T_n$	$T_n^2$								
.000	.81	0.05	0.5662	0.3206	1.0022	0.8242	0.6794	2.5730				
		0.15	0.2538	0.0644	1.4211	0.9673	0.9356	2.9919				
		0.25	0.2077	0.0431	1.5708	0.9782	0.9569	3.1416				
		0.35	0.2538	0.0644	1.7205	0.9673	0.9356	3.2913				
		0.45	0.5662	0.3206	2.1394	0.8242	0.6794	3.7102				
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708				
		0.55	0.5662	0.3206	4.1438	0.8242	0.6794	2.5730				
		0.65	0.2538	0.0644	4.5626	0.9673	0.9356	2.9919				
		0.75	0.2077	0.0431	4.7124	0.9782	0.9569	3.1416				
		0.85	0.2538	0.0644	4.8621	0.9673	0.9356	3.2913				
		0.95	0.5662	0.3206	5.2810	0.8242	0.6794	3.7102				
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708				
		1.05	0.5662	0.3206	7.2854	0.8242	0.6794	2.5730				
		1.15	0.2538	0.0644	7.7042	0.9673	0.9356	2.9919				
		1.25	0.2077	0.0431	7.8540	0.9782	0.9569	3.1416				
		1.35	0.2538	0.0644	8.0037	0.9673	0.9356	3.2913				
		1.45	0.5662	0.3206	8.4226	0.8242	0.6794	3.7102				
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708				



# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

P	r	$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$		$\frac{T_n}{T_n}$	$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2\theta}$		$\frac{R^2}{R}$	$\frac{R'}{R}$
		$\frac{ds}{\lambda}$	$\frac{T_n}{T_n}$		$\frac{R^2}{R}$	$\frac{R'}{R}$		
.010	.81	0.05	0.5649	0.3191	0.9989	0.8223	0.6761	2.5745
		0.15	0.2534	0.0642	1.4179	0.9658	0.9329	2.9921
		0.25	0.2073	0.0430	1.5708	0.9766	0.9538	3.1416
		0.35	0.2529	0.0640	1.7280	0.9640	0.9292	3.2908
		0.45	0.5538	0.3067	2.1684	0.8071	0.6514	3.6957
		0.50	0.9296	0.8641	3.1416	0.0688	0.0047	3.1416
		0.55	0.5511	0.3037	4.1085	0.8035	0.6456	2.5909
		0.65	0.2521	0.0636	4.5489	0.9612	0.9239	2.9929
		0.75	0.2066	0.0427	4.7124	0.9734	0.9476	3.1416
		0.85	0.2516	0.0633	4.8801	0.9593	0.9203	3.2899
		0.95	0.5401	0.2917	5.3406	0.7899	0.6239	3.6783
		1.00	0.8682	0.7538	6.2832	0.1285	0.0165	3.1416
		1.05	0.5373	0.2887	7.2198	0.7867	0.6188	2.6085
		1.15	0.2508	0.0629	7.6800	0.9566	0.9151	2.9938
		1.25	0.2058	0.0424	7.8540	0.9703	0.9415	3.1416
		1.35	0.2502	0.0626	8.0322	0.9548	0.9116	3.2890
		1.45	0.5264	0.2771	8.5114	0.7746	0.6000	3.6598
		1.50	0.8142	0.6630	9.4248	0.1808	0.0327	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	$\frac{ds}{r}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
.000	.000				1.0285	0.8398	0.7053	2.5993
	.02	0.05	0.5429	0.2947	1.4294	0.9708	0.9425	3.0002
	.05	0.15	0.2397	0.0575	1.5708	0.9806	0.9616	3.1416
	.10	0.25	0.1959	0.0384	1.7122	0.9708	0.9425	3.2830
	.15	0.35	0.2397	0.0575	2.1131	0.8398	0.7053	3.6839
	.20	0.45	0.5429	0.2947	3.1416	0.0000	0.0000	1.5708
	.25	0.50	1.0000	1.0000	4.1701	0.8398	0.7053	2.5993
	.30	0.55	0.5429	0.2947	4.5710	0.9708	0.9425	3.0002
	.35	0.65	0.2397	0.0575	4.7124	0.9806	0.9616	3.1416
	.40	0.75	0.1959	0.0384	4.8538	0.9708	0.9425	3.2830
	.45	0.85	0.2397	0.0575	5.2547	0.8398	0.7053	3.6839
	.50	0.95	0.5429	0.2947	5.2832	0.0000	0.0000	1.5708
	.55	1.00	1.0000	1.0000	7.3117	0.8398	0.7053	2.5993
	.60	1.05	0.5429	0.2947	7.7126	0.9708	0.9425	3.0002
	.65	1.15	0.2397	0.0575	7.8540	0.9806	0.9616	3.1416
	.70	1.25	0.1959	0.0384	7.9954	0.9708	0.9425	3.2830
	.75	1.35	0.2397	0.0575	8.3963	0.8398	0.7053	3.6839
	.80	1.45	0.5429	0.2947	9.4248	0.0000	0.0000	1.5708
	.85	1.50	1.0000	1.0000				

## REPORT NO. NADC-EL-52195

$d_s = \frac{\pi \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$		$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$		$T_h$		$T_n^2$		$R$		$R^2$		$R'$	
$P$	$r$	$d_s$	$T_n$	$T_n^2$	$T_h$	$T_n^2$	$T_h$	$R$	$R^2$	$R'$	$R^2$	$R'$	$R^2$
.005	.82	0.05	0.5422	0.2940	1.0268	0.2940	1.0268	0.8388	0.7036	2.6000	0.7036	2.6000	0.7036
		0.15	0.2395	0.0574	1.4278	0.0574	1.4278	0.9702	0.9412	3.0003	0.9412	3.0003	0.9412
		0.25	0.1957	0.0383	1.5708	0.0383	1.5708	0.9799	0.9602	3.1416	0.9602	3.1416	0.9602
		0.35	0.2393	0.0573	1.7159	0.0573	1.7159	0.9693	0.9395	3.2827	0.9395	3.2827	0.9395
		0.45	0.5371	0.2885	2.1284	0.2885	2.1284	0.8311	0.6907	3.6775	0.6907	3.6775	0.6907
		0.50	0.9614	0.9243	3.1416	0.9243	3.1416	0.0378	0.0014	3.1416	0.0014	3.1416	0.0014
		0.55	0.5358	0.2871	4.1514	0.2871	4.1514	0.8202	0.6876	2.6072	0.6876	2.6072	0.6876
		0.65	0.2390	0.0571	4.5640	0.0571	4.5640	0.9673	0.9369	3.0007	0.9369	3.0007	0.9369
		0.75	0.1954	0.0382	4.7124	0.0382	4.7124	0.9784	0.9572	3.1416	0.9572	3.1416	0.9572
		0.85	0.2387	0.0570	4.8629	0.0570	4.8629	0.9671	0.9352	3.2824	0.9352	3.2824	0.9352
		0.95	0.5306	0.2816	5.2855	0.2816	5.2855	0.8218	0.6754	3.6899	0.6754	3.6899	0.6754
		1.00	0.9257	0.8563	6.02832	0.8563	6.02832	0.0728	0.0053	3.1416	0.0053	3.1416	0.0053
		1.05	0.5293	0.2802	7.2755	0.2802	7.2755	0.8200	0.6725	2.6149	0.6725	2.6149	0.6725
		1.15	0.2384	0.0568	7.7003	0.0568	7.7003	0.9657	0.9325	3.0010	0.9325	3.0010	0.9325
		1.25	0.1951	0.0381	7.8540	0.0381	7.8540	0.9769	0.9543	3.1416	0.9543	3.1416	0.9543
		1.35	0.2382	0.0567	8.0098	0.0567	8.0098	0.9649	0.9309	3.2820	0.9309	3.2820	0.9309
		1.45	0.5242	0.2747	8.4443	0.2747	8.4443	0.8131	0.6611	3.6619	0.6611	3.6619	0.6611
		1.50	0.8924	0.7964	9.4248	0.7964	9.4248	0.1053	0.0111	3.1416	0.0111	3.1416	0.0111

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NAEC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.010}$	$\frac{r}{.82}$	$\frac{ds}{.05}$	$\frac{1_n}{.2933}$	$\frac{T_n^2}{1.0250}$	$\frac{T_n}{0.8378}$	$\frac{R^2}{0.7020}$	$\frac{R'}{2.6007}$
0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
0.45	0.45	0.45	0.45	0.45	0.45	0.45	0.45
0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55
0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65
0.75	0.75	0.75	0.75	0.75	0.75	0.75	0.75
0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15
1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
1.35	1.35	1.35	1.35	1.35	1.35	1.35	1.35
1.45	1.45	1.45	1.45	1.45	1.45	1.45	1.45
1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

p	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub> '	R	R <sup>2</sup>	R'
1.000	.83	0.05	0.5186	0.2689	1.0562	0.8550	0.7311	2.6270
		0.15	0.2257	0.0509	1.4378	0.9742	0.9491	3.0086
		0.25	0.1842	0.0339	1.5708	0.9829	0.9661	3.1416
		0.35	0.2257	0.0509	1.7038	0.9742	0.9491	3.2746
		0.45	0.5186	0.2689	2.0854	0.8550	0.7311	3.6562
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.5186	0.2689	4.1973	0.8550	0.7311	2.6270
		0.65	0.2257	0.0509	4.5793	0.9742	0.9491	3.0086
		0.75	0.1842	0.0339	4.7124	0.9829	0.9661	3.1416
		0.85	0.2257	0.0509	4.8454	0.9742	0.9491	3.2746
		0.95	0.5186	0.2689	5.2270	0.8550	0.7311	3.6562
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.5186	0.2689	7.3394	0.8550	0.7311	2.6270
		1.15	0.2257	0.0509	7.7209	0.9742	0.9491	3.0086
		1.25	0.1842	0.0339	7.8540	0.9829	0.9661	3.1416
		1.35	0.2257	0.0509	7.9870	0.9742	0.9491	3.2746
		1.45	0.5186	0.2689	8.3686	0.8550	0.7311	3.6562
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$d_s = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$			$P = \frac{\epsilon \tan^3}{\epsilon - \sin^2\theta}$					
$\frac{P}{.005}$	$\frac{r}{.83}$	$\frac{d_s}{.05}$	$\frac{T_n}{.5180}$	$\frac{T_n^2}{0.2683}$	$\frac{T_n}{1.0543}$	$\frac{R}{0.8541}$	$\frac{R^2}{0.7294}$	$\frac{R'}{2.6275}$
		0.05	0.5180	0.2683	1.0543	0.8541	0.7294	2.6275
		0.15	0.2255	0.0509	1.4361	0.9736	0.9478	3.0086
		0.25	0.1841	0.0339	1.5708	0.9822	0.9647	3.1416
		0.35	0.2253	0.0508	1.7076	0.9727	0.9462	3.2744
		0.45	0.5132	0.2634	2.1016	0.8464	0.7164	3.6509
		0.50	0.9591	0.9198	3.1416	0.0402	0.0016	3.1416
		0.55	0.5120	0.2621	4.1778	0.8445	0.7132	2.6336
		0.65	0.2250	0.0506	4.5723	0.9715	0.9437	3.0089
		0.75	0.1838	0.0338	4.7124	0.9608	0.9619	3.1416
		0.85	0.2248	0.0505	4.8546	0.9706	0.9421	3.2741
		0.95	0.5072	0.2572	5.2608	0.8372	0.7010	3.6441
		1.00	0.9213	0.8488	6.2832	0.0772	0.0060	3.1416
		1.05	0.5060	0.2560	7.3021	0.8355	0.6980	2.6405
		1.15	0.2245	0.0504	7.7085	0.9694	0.9397	3.0093
		1.25	0.1835	0.0337	7.8540	0.9793	0.9591	3.1416
		1.35	0.2243	0.0503	8.0016	0.9685	0.9381	3.2738
		1.45	0.5011	0.2511	8.4192	0.8285	0.6865	3.6369
		1.50	0.8864	0.7856	9.4248	0.1114	0.0124	3.1416

**REPORT NO. NADC-EL-52195**

P	r	d <sub>s</sub>	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{T_n}$	$\frac{R}{q - \sin^2 \theta}$	$\frac{R^2}{q - \sin^2 \theta}$	$\frac{R'}{2.6281}$
0.010	.83	0.05	0.5174	0.2677	1.0525	0.8531	0.7278	2.6281
		0.15	0.2254	0.0508	1.4345	0.9729	0.9465	3.0087
		0.25	0.1839	0.0338	1.5708	0.9815	0.9633	3.1416
		0.35	0.2250	0.0506	1.7114	0.9713	0.9433	3.2742
		0.45	0.5078	0.2578	2.1175	0.8381	0.7025	3.6448
		0.50	0.9213	0.8488	3.1416	0.0772	0.0050	3.1416
		0.55	0.5054	0.2554	4.1589	0.3346	0.6965	2.6412
		0.65	0.2243	0.0503	4.5653	0.9687	0.9355	3.0094
		0.75	0.1834	0.0336	4.7124	0.9786	0.9577	3.1416
		0.85	0.2239	0.0501	4.8637	0.9671	0.9353	3.2735
		0.95	0.4957	0.2457	5.2923	0.8211	0.6742	3.6300
		1.00	0.8539	0.7292	6.2832	0.1432	0.0205	3.1416
		1.05	0.4932	0.2433	7.2676	0.8179	0.6690	2.6563
		1.15	0.2232	0.0498	7.6963	0.9646	0.9305	3.0101
		1.25	0.1827	0.0334	7.8540	0.9758	0.9523	3.1416
		1.35	0.2228	0.0496	8.0159	0.9630	0.9273	3.2727
		1.45	0.4835	0.2338	8.4655	0.8059	0.6495	3.6139
		1.50	0.7955	0.6329	9.4248	0.2001	0.0400	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x\sqrt{r - \sin^2\theta}}{\lambda}$$

$$P = \frac{e \tan \delta}{4 - \sin^2\theta}$$

$\frac{P}{.000}$	$\frac{r}{.84}$	$\frac{d_s}{.05}$	$\frac{T_n}{.4933}$	$\frac{T_n^2}{.2433}$	$\frac{T_n}{1.0884}$	$\frac{R}{.8699}$	$\frac{R^2}{.7567}$	$\frac{R'}{2.6592}$
		0.05	0.4933	0.2433	1.0884	0.8699	0.7567	2.6592
		0.15	0.2117	0.0448	1.4460	0.9773	0.9552	3.0168
		0.25	0.1726	0.0298	1.5708	0.9850	0.9702	3.1416
		0.35	0.2117	0.0448	1.6956	0.9773	0.9552	3.2663
		0.45	0.4933	0.2433	2.0532	0.8699	0.7567	3.5240
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.4933	0.2433	4.2300	0.8699	0.7567	2.5592
		0.65	0.2117	0.0448	4.5876	0.9773	0.9552	3.1168
		0.75	0.1726	0.0298	4.7124	0.9850	0.9702	3.1416
		0.85	0.2117	0.0448	4.8371	0.9773	0.9552	3.2663
		0.95	0.4933	0.2433	5.1947	0.8699	0.7567	3.5240
		1.00	1.0000	1.0000	5.2632	0.0000	0.0000	1.5708
		1.05	0.4933	0.2433	7.3716	0.8699	0.7567	2.5592
		1.15	0.2117	0.0448	7.7292	0.9773	0.9552	3.0168
		1.25	0.1726	0.0298	7.8540	0.9850	0.9702	3.1416
		1.35	0.2117	0.0448	7.9787	0.9773	0.9552	3.2663
		1.45	0.4933	0.2433	8.3363	0.8699	0.7567	3.5240
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$p = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.005}$	$\frac{r}{.84}$	$\frac{ds}{.05}$	$\frac{T_n}{.4927}$	$\frac{T_n^2}{0.2428}$	$\frac{T_n}{1.0860}$	$\frac{R}{0.8689}$	$\frac{R^2}{0.7550}$	$\frac{R'}{2.6592}$
		0.15	0.2116	0.0448	1.4444	0.9767	0.9540	3.0169
		0.25	0.1725	0.0298	1.5703	0.9843	0.9689	3.1416
		0.35	0.2114	0.0447	1.6994	0.9759	0.9525	3.2662
		0.45	0.4883	0.2385	2.0732	0.8614	0.7420	3.6222
		0.50	0.9565	0.9148	3.1416	0.0429	0.0018	3.1416
		0.55	0.4872	0.2374	4.2060	0.8595	0.7388	2.6618
		0.65	0.2111	0.0446	4.5806	0.9748	0.9501	3.0172
		0.75	0.1722	0.0297	4.7124	0.9830	0.9663	3.1416
		0.85	0.2109	0.0445	4.8464	0.9740	0.9486	3.2659
		0.95	0.4828	0.2331	5.2340	0.8524	0.7265	3.6173
		1.00	0.9165	0.8399	6.2832	0.0822	0.0067	3.1416
		1.05	0.4817	0.2320	7.3288	0.8506	0.7235	2.6671
		1.15	0.2107	0.0444	7.7168	0.9728	0.9453	3.0175
		1.25	0.1720	0.0296	7.8540	0.9817	0.9637	3.1416
		1.35	0.2105	0.0443	7.9934	0.9720	0.9448	3.2656
		1.45	0.4772	0.2277	8.3934	0.8438	0.7119	3.6110
		1.50	0.8797	0.7738	9.4248	0.1183	0.0140	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{0.10}$	$\frac{r}{.84}$	$\frac{d_s}{.05}$	$\frac{T_n}{.4922}$	$\frac{T_n^2}{0.2423}$	$\frac{T_n}{1.0836}$	$\frac{R}{0.8679}$	$\frac{R^2}{0.7533}$	$\frac{R'}{2.5592}$
		0.15	0.2114	0.0447	1.4428	0.9761	0.9529	3.0170
		0.25	0.1724	0.0297	1.5708	0.9837	0.9676	3.1416
		0.35	0.2111	0.0446	1.7032	0.9745	0.9498	3.2560
		0.45	0.4833	0.2336	2.0905	0.8532	0.7280	3.6178
		0.50	0.9165	0.8399	3.01416	0.0822	0.0067	3.1416
		0.55	0.4811	0.2315	4.1854	0.8497	0.7220	2.6677
		0.65	0.2105	0.0443	4.5735	0.9722	0.9452	3.0176
		0.75	0.1719	0.0295	4.7124	0.9810	0.9624	3.1416
		0.85	0.2101	0.0442	4.8555	0.9706	0.9421	3.2554
		0.95	0.4721	0.2229	5.2672	0.8364	0.6996	3.6048
		1.00	0.8456	0.7151	5.2832	0.1516	0.0230	3.1416
		1.05	0.4699	0.2208	7.2925	0.8333	0.6943	2.6812
		1.15	0.2095	0.0439	7.7044	0.9683	0.9376	3.0182
		1.25	0.1713	0.0293	7.8540	0.9784	0.9572	3.1416
		1.35	0.2091	0.0437	8.0078	0.9667	0.9346	3.2546
		1.45	0.4608	0.2123	8.4416	0.8213	0.6746	3.5900
		1.50	0.7848	0.6159	9.4248	0.2111	0.0446	3.1416

## REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.85}$	$\frac{ds}{.005}$	$\frac{T_n}{.04671}$	$\frac{T_n^2}{.02182}$	$\frac{T_n}{1.1019}$	$\frac{R}{.08842}$	$\frac{R^2}{.07818}$	$\frac{R'}{2.6727}$
		0.05	0.4671	0.2182	1.1019	0.8842	0.7818	2.6727
		0.15	0.1978	0.0391	1.4543	0.9802	0.9609	3.0251
		0.25	0.1611	0.0260	1.5708	0.9869	0.9740	3.1416
		0.35	0.1978	0.0391	1.6373	0.9802	0.9609	3.2581
		0.45	0.4671	0.2182	2.0397	0.8842	0.7818	3.6105
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.4671	0.2182	4.2435	0.8842	0.7818	2.6727
		0.65	0.1978	0.0391	4.5959	0.9802	0.9609	3.0251
		0.75	0.1611	0.0260	4.7124	0.9869	0.9740	3.1416
		0.85	0.1978	0.0391	4.8289	0.9802	0.9609	3.2581
		0.95	0.4671	0.2182	5.1813	0.8842	0.7818	3.6105
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.4671	0.2182	7.7375	0.8842	0.7818	3.0251
		1.15	0.1978	0.0391	7.3851	0.9802	0.9609	2.6727
		1.25	0.1611	0.0260	7.8540	0.9869	0.9740	3.1416
		1.35	0.1978	0.0391	7.9705	0.9802	0.9609	3.2581
		1.45	0.4671	0.2182	8.3229	0.8842	0.7818	3.6105
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$$dg = \frac{x \sqrt{e - \sin^2 \theta}}{\lambda}$$

$\frac{P}{0.05}$	$\frac{x}{0.35}$	$\frac{dg}{0.05}$	$\frac{T_n}{0.4666}$	$\frac{T_n^2}{0.2177}$	$\frac{T_n''}{1.0989}$	$\frac{R}{0.8833}$	$\frac{R^2}{0.7802}$	$\frac{R'}{2.6722}$
		0.15	0.1977	0.0391	1.4526	0.9797	0.9593	3.0251
		0.25	0.1610	0.0259	1.5708	0.9863	0.9723	3.1416
		0.35	0.1575	0.0390	1.6911	0.9739	0.9583	3.2579
		0.45	0.4626	0.2140	2.0363	0.8759	0.7672	3.5853
		0.50	0.9535	0.9091	3.1416	0.0459	0.0021	3.1416
		0.55	0.4616	0.2130	4.2409	0.8741	0.7641	2.6967
		0.65	0.1973	0.0389	4.5888	0.9778	0.9561	3.0254
		0.75	0.1608	0.0259	4.7124	0.9851	0.9704	3.1416
		0.85	0.1971	0.0389	4.8382	0.9771	0.9547	3.2577
		0.95	0.4575	0.2093	5.2040	0.8671	0.7518	3.5873
		1.00	0.9111	0.8300	6.2832	0.0877	0.0077	3.1416
		1.05	0.4565	0.2084	7.3580	0.8654	0.7489	2.6963
		1.15	0.1969	0.0388	7.7249	0.9760	0.9525	3.0256
		1.25	0.1606	0.0258	7.8540	0.9838	0.9679	3.1416
		1.35	0.1967	0.0387	7.9852	0.9732	0.9511	3.2574
		1.45	0.4523	0.2046	8.3661	0.8587	0.7373	3.5837
		1.50	0.8722	0.7607	9.4248	0.1259	0.0159	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$\frac{p}{r}$	$\frac{r}{d_s}$	$\frac{T_n}{T_n^2}$	$\frac{T_n^2}{T_n^2}$	$\frac{R}{R}$	$\frac{R'}{R'}$
0.10	0.25	0.4661	0.2172	0.8823	2.6715
	0.15	0.1976	0.0390	0.9791	3.0252
	0.25	0.1609	0.0259	0.9857	3.1416
	0.35	0.1972	0.0389	0.9776	3.2578
	0.45	0.4580	0.2098	0.8679	3.5875
	0.50	0.9111	0.8300	0.0877	3.1416
	0.55	0.4560	0.2079	0.5645	2.6966
	0.65	0.1967	0.0387	0.9754	3.0257
	0.75	0.1604	0.0257	0.9832	3.1416
	0.85	0.1964	0.0386	0.9739	3.2572
	0.95	0.4477	0.2004	0.8514	3.5787
	1.00	0.8364	0.6996	0.1610	3.1416
	1.05	0.4456	0.1985	0.8483	2.7070
	1.15	0.1959	0.0384	0.9718	3.0263
	1.25	0.1600	0.0256	0.9307	3.1416
	1.35	0.1955	0.0382	0.9703	3.2566
	1.45	0.4372	0.1911	0.8366	3.5554
	1.50	0.7730	0.5975	0.2232	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{s - \sin^2\theta}}{\lambda}$$

$$P = \frac{4 \tan \theta}{s - \sin^2\theta}$$

$\frac{P}{\text{---}}$	$\frac{r}{\text{---}}$	$\frac{d_s}{\text{---}}$	$\frac{T_n}{\text{---}}$	$\frac{T_n^2}{\text{---}}$	$\frac{T_n^3}{\text{---}}$	$\frac{R}{\text{---}}$	$\frac{R^2}{\text{---}}$	$\frac{R^3}{\text{---}}$
.000	.86	0.05	0.4400	0.1936	1.1375	0.8980	0.8064	2.7083
		0.15	0.1839	0.0338	1.4625	0.9829	0.9662	3.0333
		0.25	0.1497	0.0224	1.5708	0.9887	0.9776	3.1416
		0.35	0.1839	0.0338	1.6791	0.9829	0.9662	3.2499
		0.45	0.4400	0.1936	2.0041	0.8980	0.8064	3.5748
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.4400	0.1936	4.2791	0.8980	0.8064	2.7083
		0.65	0.1839	0.0338	4.6041	0.9829	0.9662	3.0333
		0.75	0.1497	0.0224	4.7124	0.9887	0.9776	3.1416
		0.85	0.1839	0.0338	4.8207	0.9829	0.9662	3.2499
		0.95	0.4400	0.1936	5.1456	0.8980	0.8064	3.5748
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.4400	0.1936	7.4207	0.8980	0.8064	2.7083
		1.15	0.1839	0.0338	7.7457	0.9829	0.9662	3.0333
		1.25	0.1497	0.0224	7.8540	0.9887	0.9776	3.1416
		1.35	0.1839	0.0338	7.9623	0.9829	0.9662	3.2499
		1.45	0.4400	0.1936	8.2872	0.8980	0.8064	3.5748
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$$d_s = \frac{\lambda}{\sqrt{e - \sin^2 \theta}}$$

$\frac{P}{0.05}$	$\frac{r}{.85}$	$\frac{d_s}{.05}$	$\frac{T_n}{.4395}$	$\frac{T_n^2}{0.1932}$	$\frac{T_n}{1.1354}$	$\frac{R}{0.8971}$	$\frac{R^2}{0.8048}$	$\frac{R'}{2.7086}$
	0.15	0.1838	0.1838	0.0338	1.4603	0.9824	0.9651	3.0333
	0.25	0.1496	0.1496	0.0224	1.5708	0.9882	0.9764	3.1416
	0.35	0.1837	0.1837	0.0337	1.6830	0.9817	0.9638	3.2498
	0.45	0.4359	0.4359	0.1900	2.0243	0.8900	0.7920	3.5733
	0.50	0.9501	0.9501	0.9027	3.1416	0.0493	0.0024	3.1416
	0.55	0.4350	0.4350	0.1892	4.2539	0.8882	0.7889	2.7097
	0.65	0.1835	0.1835	0.0337	4.5969	0.9807	0.9617	3.0335
	0.75	0.1494	0.1494	0.0223	4.7124	0.9870	0.9742	3.1416
	0.85	0.1834	0.1834	0.0336	4.8301	0.9800	0.9604	3.2496
	0.95	0.4313	0.4313	0.1860	5.1942	0.8814	0.7768	3.5775
	1.00	0.9043	0.9043	0.8189	6.2832	0.0939	0.0088	3.1416
	1.05	0.4304	0.4304	0.1852	7.3983	0.8797	0.7739	2.7367
	1.15	0.1831	0.1831	0.0335	7.7330	0.9789	0.9583	3.0338
	1.25	0.1492	0.1492	0.0223	7.8540	0.9858	0.9719	3.1416
	1.35	0.1830	0.1830	0.0335	7.9771	0.9783	0.9570	3.2493
	1.45	0.4266	0.4266	0.1820	8.3339	0.8732	0.7624	3.5516
	1.50	0.8638	0.8638	0.7461	9.4248	0.1344	0.0181	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52135

$$ds = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	ds	$\frac{T_n}{T_h}$	$\frac{T_n^2}{T_h^2}$	$\frac{T_n}{T_h}$	$\frac{R}{\epsilon - \sin^2 \theta}$	$\frac{R^2}{\epsilon - \sin^2 \theta}$	$\frac{R'}{\epsilon - \sin^2 \theta}$
.010	.86	0.05	0.4391	0.1928	1.1332	0.8962	0.8032	2.7089
		0.15	0.1837	0.0338	1.4592	0.9819	0.9641	3.0334
		0.25	0.1495	0.0224	1.5708	0.9876	0.9753	3.1416
		0.35	0.1835	0.0337	1.6868	0.9805	0.9614	3.2496
		0.45	0.4318	0.1864	2.0492	0.8822	0.7783	3.5765
		0.50	0.9049	0.8189	3.1416	0.0939	0.0088	3.1416
		0.55	0.4299	0.1848	4.2532	0.8789	0.7724	2.7355
		0.65	0.1830	0.0335	4.5898	0.9784	0.9573	3.0334
		0.75	0.1491	0.0222	4.7124	0.9853	0.9707	3.1416
		0.85	0.1827	0.0334	4.8393	0.9771	0.9546	3.2492
		0.95	0.4224	0.1784	5.2128	0.8661	0.7501	3.5504
		1.00	0.8262	0.6826	6.2332	0.1715	0.0294	3.1416
		1.05	0.4204	0.1768	7.3455	0.8631	0.7449	2.7343
		1.15	0.1823	0.0332	7.7205	0.9750	0.9506	3.0344
		1.25	0.1487	0.0221	7.8540	0.9830	0.9662	3.1416
		1.35	0.1820	0.0331	7.9918	0.9736	0.9480	3.2486
		1.45	0.4127	0.1703	8.3917	0.8515	0.7251	3.5401
		1.50	0.7599	0.5774	9.4248	0.2366	0.0560	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.87}$	$\frac{ds}{.05}$	$\frac{T_n}{.4120}$	$\frac{T_n^2}{.1697}$	$\frac{T_n}{1.1679}$	$\frac{R}{.9112}$	$\frac{R^2}{.8302}$	$\frac{R'}{2.7387}$
		0.05	0.4120	0.1697	1.1679	0.9112	0.8302	2.7387
		0.15	0.1702	0.0290	1.4706	0.9854	0.9710	3.0414
		0.25	0.1384	0.0191	1.5708	0.9904	0.9809	3.1416
		0.35	0.1702	0.0290	1.6710	0.9854	0.9710	3.2418
		0.45	0.4120	0.1697	1.9737	0.9112	0.8303	3.5445
		0.50	1.0000	1.0000	3.1415	0.0000	0.0000	1.5708
		0.55	0.4120	0.1697	4.3095	0.9112	0.8303	2.7387
		0.65	0.1702	0.0290	4.6122	0.9854	0.9710	3.0414
		0.75	0.1384	0.0191	4.7124	0.9904	0.9809	3.1416
		0.85	0.1702	0.0290	4.8126	0.9854	0.9710	3.2418
		0.95	0.4120	0.1697	5.1152	0.9112	0.8303	3.5445
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.4120	0.1697	7.4511	0.9112	0.8303	2.7387
		1.15	0.1702	0.0290	7.7538	0.9854	0.9710	3.0414
		1.25	0.1384	0.0191	7.8540	0.9904	0.9809	3.1416
		1.35	0.1702	0.0290	7.9542	0.9854	0.9710	3.2418
		1.45	0.4120	0.1697	8.2568	0.9112	0.8303	3.5445
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \delta}{a - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$\frac{p}{.005}$	$\frac{r}{.87}$	$\frac{ds}{.05}$	$\frac{T_n}{.4116}$	$\frac{T_n^2}{.1694}$	$\frac{T_n}{1.1659}$	$\frac{R}{0.9103}$	$\frac{R^2}{0.8287}$	$\frac{R'}{2.7391}$
		0.15	0.1701	0.0289	1.4689	0.9849	0.9701	3.0414
		0.25	0.1383	0.0191	1.5708	0.9898	0.9798	3.1416
		0.35	0.1700	0.0289	1.6749	0.9843	0.9688	3.2417
		0.45	0.4084	0.1668	1.9921	0.9034	0.8162	3.5411
		0.50	0.3463	0.8954	3.1416	0.0532	0.0028	3.1416
		0.55	0.4075	0.1661	4.2870	0.9017	0.8131	2.7427
		0.65	0.1698	0.0288	4.6050	0.9833	0.9669	3.0416
		0.75	0.1381	0.0191	4.7124	0.9888	0.9777	3.1416
		0.85	0.1697	0.0289	4.8220	0.9827	0.9656	3.2415
		0.95	0.4042	0.1634	5.1550	0.8951	0.8013	3.5383
		1.00	0.8970	0.8063	6.2832	0.1010	0.0102	3.1416
		1.05	0.4034	0.1627	7.4069	0.8935	0.7984	2.7452
		1.15	0.1695	0.0287	7.7411	0.9817	0.9638	3.0418
		1.25	0.1380	0.0190	7.8540	0.9877	0.9755	3.1416
		1.35	0.1694	0.0287	7.9691	0.9811	0.9625	3.2413
		1.45	0.4000	0.1600	8.3212	0.8872	0.7871	3.5388
		1.50	0.8543	0.7298	9.4248	0.1441	0.0208	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$p = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$\frac{P}{.010}$	$\frac{r}{.87}$	$\frac{ds}{.05}$	$\frac{T_n}{.4112}$	$\frac{T_n^2}{.01691}$	$\frac{T_n}{1.1639}$	$\frac{R}{.9094}$	$\frac{R^2}{0.8271}$	$\frac{R'}{2.7395}$
		0.15	0.1700	0.0289	1.4673	0.9844	0.9691	3.0415
		0.25	0.1382	0.0191	1.5708	0.9893	0.9787	3.1416
		0.35	0.1698	0.0288	1.6787	0.9832	0.9666	3.2415
		0.45	0.4047	0.1637	2.0111	0.8960	0.8027	3.5385
		0.50	0.3979	0.8063	3.1416	0.1010	0.0102	3.1416
		0.55	0.4030	0.1624	4.2630	0.8927	0.7969	2.7453
		0.65	0.1694	0.0237	4.5979	0.9812	0.9628	3.0419
		0.75	0.1379	0.0190	4.7124	0.9872	0.9745	3.1416
		0.85	0.1691	0.0236	4.8313	0.9800	0.9603	3.2411
		0.95	0.3962	0.1570	5.1759	0.8803	0.7750	3.5135
		1.00	0.8146	0.6636	6.2832	0.1832	0.0336	3.1416
		1.05	0.3944	0.1556	7.3786	0.8774	0.7698	2.7673
		1.15	0.1687	0.0285	7.7285	0.9780	0.9566	3.0423
		1.25	0.1375	0.0189	7.8540	0.9850	0.9703	3.1416
		1.35	0.1685	0.0284	7.9838	0.9768	0.9541	3.2406
		1.45	0.3874	0.1501	8.3649	0.8662	0.7503	3.5133
		1.50	0.7453	0.5554	9.4248	0.2515	0.0632	3.1416

$d_s = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$		$p = \frac{e \tan \theta}{e - \sin^2 \theta}$			
$\frac{p}{\frac{1}{100}}$	$\frac{r}{\frac{1}{100}}$	$\frac{d_s}{\frac{1}{100}}$	$T_n$	$T_n^2$	$T_n'$
			$\frac{T_n}{0.3831}$	$\frac{T_n^2}{0.1468}$	$\frac{T_n'}{1.1978}$
					$\frac{R}{0.9237}$
					$\frac{R^2}{0.8532}$
					$\frac{R'}{2.7686}$
0.15	0.15	0.1565	0.1271	0.0162	1.4787
0.25	0.25	0.1271	0.1565	0.0245	1.5708
0.35	0.35	0.1565	0.1271	0.0162	1.4787
0.45	0.45	0.1271	0.1565	0.0245	1.5708
0.50	0.50	0.1000	0.1831	0.0334	1.6629
0.55	0.55	0.1331	0.1468	0.0214	1.6438
0.65	0.65	0.1565	0.1271	0.0162	1.4787
0.75	0.75	0.1271	0.1565	0.0245	1.5708
0.85	0.85	0.1565	0.1271	0.0162	1.4787
0.95	0.95	0.1271	0.1565	0.0245	1.5708
1.00	1.00	0.1000	0.1831	0.0334	1.6629
1.05	1.05	0.1331	0.1468	0.0214	1.6438
1.15	1.15	0.1565	0.1271	0.0162	1.4787
1.25	1.25	0.1271	0.1565	0.0245	1.5708
1.35	1.35	0.1565	0.1271	0.0162	1.4787
1.45	1.45	0.1271	0.1565	0.0245	1.5708
1.50	1.50	0.1000	0.1831	0.0334	1.6629

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$\frac{p}{1.005}$	$\frac{r}{.88}$	$\frac{d_s}{d_s}$	$d_s = \frac{x \cdot \sqrt{1 - \sin^2 \theta}}{\lambda}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
		0.05	0.3828	0.1465	1.1957	0.9229	0.8517	2.7689	
		0.15	0.1564	0.0245	1.4770	0.9872	0.9746	3.0495	
		0.25	0.1271	0.0161	1.5708	0.9914	0.9829	3.1416	
		0.35	0.1563	0.0244	1.6668	0.9866	0.9734	3.2336	
		0.45	0.3800	0.1444	1.9623	0.9163	0.8396	3.5114	
		0.50	0.9418	0.8870	3.1416	0.0577	0.0033	3.1416	
		0.55	0.3793	0.1438	4.3168	0.9147	0.8366	2.7726	
		0.65	0.1562	0.0244	4.6131	0.9857	0.9717	3.0497	
		0.75	0.1269	0.0161	4.7124	0.9904	0.9809	3.1416	
		0.85	0.1561	0.0244	4.8139	0.9851	0.9705	3.2334	
		0.95	0.3763	0.1416	5.1243	0.9083	0.8251	3.5076	
		1.00	0.8899	0.7920	6.2832	0.1091	0.0119	3.1416	
		1.05	0.3756	0.1411	7.4379	0.9068	0.8222	2.7763	
		1.15	0.1559	0.0243	7.7491	0.9843	0.9688	3.0498	
		1.25	0.1268	0.0161	7.8540	0.9894	0.9789	3.1416	
		1.35	0.1558	0.0243	7.9611	0.9837	0.9676	3.2333	
		1.45	0.3726	0.1388	8.2867	0.9007	0.8113	3.5043	
		1.50	0.8434	0.7114	9.4248	0.1551	0.0240	3.1416	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub> '	R	R <sup>2</sup>	R'
0.10	0.88	0.05	0.3825	0.1463	1.1936	0.9220	0.8501	2.7693
		0.15	0.1563	0.0244	1.4753	0.9868	0.9737	3.0496
		0.25	0.1270	0.0161	1.5708	0.9909	0.9819	3.1416
		0.35	0.1561	0.0244	1.6707	0.9856	0.9714	3.2335
		0.45	0.3767	0.1419	1.9007	0.9091	0.8265	3.5080
		0.50	0.8899	0.7920	3.1416	0.1091	0.0119	3.1416
		0.55	0.3752	0.1408	4.2943	0.9060	0.8208	2.7766
		0.65	0.1558	0.0243	4.6059	0.9838	0.9679	3.0499
		0.75	0.1267	0.0161	4.7124	0.9389	0.9780	3.1416
		0.85	0.1556	0.0242	4.8233	0.9826	0.9656	3.2331
		0.95	0.3692	0.1363	5.1652	0.8941	0.7995	3.5029
		1.00	0.8015	0.6424	6.2832	0.1965	0.0386	3.1416
		1.05	0.3676	0.1351	7.3910	0.8913	0.7944	2.7738
		1.15	0.1553	0.0241	7.7365	0.9809	0.9621	3.0503
		1.25	0.1264	0.0160	7.8540	0.9870	0.9741	3.1416
		1.35	0.1550	0.0240	7.9759	0.9797	0.9598	3.2327
		1.45	0.3613	0.1305	8.3332	0.8805	0.7752	3.4816
		1.50	0.7289	0.5313	9.4248	0.2681	0.0719	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x}{\lambda} \sqrt{a - \sin^2 \theta}$$

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$\frac{P}{.000}$	$\frac{r}{.30}$	$\frac{ds}{.05}$	$\frac{T_n}{.0000}$	$\frac{T_n^2}{.0000}$	$\frac{T_h}{.0000}$	$\frac{R}{.0000}$	$\frac{R^2}{.0000}$	$\frac{R'}{.0000}$
0.00	0.05	0.005	0.3536	0.1250	1.2279	0.9354	0.8750	2.7987
	0.15	0.015	0.1429	0.0204	1.4867	0.9897	0.9796	3.0575
	0.25	0.025	0.1160	0.0135	1.5708	0.9932	0.9865	3.1416
	0.35	0.035	0.1429	0.0204	1.6549	0.9897	0.9796	3.2257
	0.45	0.045	0.3536	0.1250	1.9137	0.9354	0.8750	3.4845
	0.50	0.050	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.055	0.3536	0.1250	4.3695	0.9354	0.8750	2.7987
	0.65	0.065	0.1429	0.0204	4.6283	0.9897	0.9796	3.0575
	0.75	0.075	0.1160	0.0135	4.7124	0.9932	0.9865	3.1416
	0.85	0.085	0.1429	0.0204	4.7965	0.9897	0.9796	3.2257
	0.95	0.095	0.3536	0.1250	5.0553	0.9354	0.8750	3.4845
	1.00	0.100	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	0.105	0.3536	0.1250	7.5110	0.9354	0.8750	2.7987
	1.15	0.115	0.1429	0.0204	7.7699	0.9897	0.9796	3.0575
	1.25	0.125	0.1160	0.0135	7.8540	0.9932	0.9865	3.1416
	1.35	0.135	0.1429	0.0204	7.9381	0.9897	0.9796	3.2257
	1.45	0.145	0.3536	0.1250	8.1969	0.9354	0.8750	3.4845
	1.50	0.150	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$									
$\frac{p}{.005}$	$\frac{r}{.89}$	$\frac{d_s}{.05}$	$\frac{T_n}{.03533}$	$\frac{T_n^2}{.01248}$	$\frac{T'_n}{1.2257}$	$\frac{R}{0.9346}$	$\frac{R^2}{0.8735}$	$\frac{R'}{2.7990}$	
		0.15	0.1428	0.0204	1.4850	0.9893	0.9788	3.0575	
		0.25	0.1160	0.0134	1.5708	0.9928	0.9856	3.1416	
		0.35	0.1127	0.0204	1.6588	0.9888	0.9777	3.2255	
		0.45	0.3508	0.1231	1.9326	0.9284	0.8619	3.4817	
		0.50	0.9366	0.8772	3.1416	0.0630	0.0040	3.1416	
		0.55	0.3502	0.1226	4.3464	0.9269	0.8591	2.8072	
		0.65	0.1426	0.0203	4.6210	0.9880	0.9761	3.0577	
		0.75	0.1158	0.0134	4.7124	0.9919	0.9839	3.1416	
		0.85	0.1425	0.0203	4.8050	0.9874	0.9750	3.2255	
		0.95	0.3476	0.1209	5.0949	0.9209	0.8480	3.4787	
		1.00	0.8806	0.7755	6.2832	0.1184	0.0140	3.1416	
		1.05	0.3470	0.1204	7.4673	0.9194	0.8453	2.8057	
		1.15	0.1424	0.0203	7.7571	0.9866	0.9734	3.0578	
		1.25	0.1157	0.0134	7.8540	0.9910	0.9821	3.1416	
		1.35	0.1423	0.0203	7.9531	0.9861	0.9723	3.2253	
		1.45	0.3444	0.1186	8.2570	0.9136	0.8347	3.4746	
		1.50	0.8210	0.6905	9.4248	0.1676	0.0281	3.1416	

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$d_s = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$		$p = \frac{e \tan \delta}{e - \sin^2 \theta}$	
$\frac{p}{r}$	$\frac{d_s}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{R}{R^2}$
0.010	0.80	0.005	0.9338
		0.015	0.9889
		0.025	0.9923
		0.035	0.9878
		0.045	0.9216
		0.050	0.1184
		0.055	0.9187
		0.065	0.9862
		0.075	0.9905
		0.085	0.9851
		0.095	0.9073
		1.00	0.2115
		1.05	0.9046
		1.15	0.9635
		1.25	0.9887
		1.35	0.9824
		1.45	0.8943
		1.50	0.2858
			0.8720
			0.9780
			0.9847
			0.9758
			0.8494
			0.0140
			0.8439
			0.9726
			0.9812
			0.9705
			0.8233
			3.4714
			0.0448
			3.1416
			2.8130
			3.0582
			3.1416
			3.2248
			3.4698
			0.0822
			3.1416

# Aeronautical Electronic and Electrical Laboratory

## REPORT NO. NADC-EL-52195

$$p = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$$d_s = \frac{\lambda}{\sqrt{e - \sin^2 \theta}}$$

$\frac{p}{.000}$	$\frac{r}{.90}$	$\frac{d_s}{.05}$	$\frac{T_n}{.0000}$	$\frac{T_n^2}{.0000}$	$\frac{T_n}{.0000}$	$\frac{R}{.0000}$	$\frac{R^2}{.0000}$	$\frac{R'}{.0000}$
0.05	0.05	0.05	0.3232	0.1045	1.2583	0.9463	0.8955	2.8291
0.15	0.15	0.15	0.1294	0.0167	1.4947	0.9916	0.9833	3.0655
0.25	0.25	0.25	0.1050	0.0110	1.5708	0.9945	0.9890	3.1416
0.35	0.35	0.35	0.1294	0.0167	1.6460	0.9916	0.9833	3.2177
0.45	0.45	0.45	0.3232	0.1045	1.8833	0.9463	0.8955	3.4541
0.50	0.50	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55	0.55	0.55	0.3232	0.1045	4.3999	0.9463	0.8955	2.8291
0.65	0.65	0.65	0.1294	0.0167	4.6363	0.9916	0.9833	3.0655
0.75	0.75	0.75	0.1050	0.0110	4.7124	0.9945	0.9890	3.1416
0.85	0.85	0.85	0.1294	0.0167	4.7885	0.9916	0.9833	3.2177
0.95	0.95	0.95	0.3232	0.1045	5.0249	0.9463	0.8955	3.4541
1.00	1.00	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05	1.05	1.05	0.3232	0.1045	7.5415	0.9463	0.8955	2.8291
1.15	1.15	1.15	0.1294	0.0167	7.7779	0.9916	0.9833	3.0655
1.25	1.25	1.25	0.1050	0.0110	7.8540	0.9945	0.9890	3.1416
1.35	1.35	1.35	0.1294	0.0167	7.9301	0.9916	0.9833	3.2177
1.45	1.45	1.45	0.3232	0.1045	8.1665	0.9463	0.8955	3.4541
1.50	1.50	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52105

$$P = \frac{4 \tan \delta}{4 - \sin 2\theta}$$

$$ds = \frac{x \sqrt{1 - \sin^2 \theta}}{\lambda}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.005	.90	0.05	0.3230	0.1043	1.2561	0.9456	0.8941	2.8294
		0.15	0.1293	0.0167	1.4930	0.9912	0.9825	3.0555
		0.25	0.1049	0.0110	1.5708	0.9941	0.9882	3.1416
		0.35	0.1293	0.0167	1.6508	0.9907	0.9815	3.2176
		0.45	0.3209	0.1030	1.9026	0.9397	0.8831	3.4517
		0.50	0.9304	0.8656	3.1416	0.0692	0.0048	3.1416
		0.55	0.3204	0.1026	4.3763	0.9383	0.8804	2.8321
		0.65	0.1292	0.0167	4.6290	0.9900	0.9801	3.0656
		0.75	0.1048	0.0110	4.7124	0.9932	0.9865	3.1416
		0.85	0.1291	0.0167	4.7980	0.9895	0.9791	3.2175
		0.95	0.3182	0.1013	5.0654	0.9327	0.8699	3.4487
		1.00	0.8697	0.7564	6.2832	0.1294	0.0168	3.1416
		1.05	0.3177	0.1009	7.4968	0.9313	0.8673	2.8351
		1.15	0.1290	0.0166	7.7650	0.9888	0.9776	3.0657
		1.25	0.1047	0.0110	7.8540	0.9924	0.9849	3.1416
		1.35	0.1289	0.0156	7.9452	0.9883	0.9767	3.2174
		1.45	0.3154	0.0995	8.2278	0.9259	0.8572	3.4454
		1.50	0.8165	0.6667	9.4248	0.1823	0.0332	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{\lambda}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>m</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.010	.90	0.05	0.3227	0.1042	1.2540	0.9448	0.8927	2.8726
		0.15	0.1293	0.0167	1.4913	0.9909	0.9818	3.0655
		0.25	0.1049	0.0110	1.5708	0.9937	0.9874	3.1416
		0.35	0.1291	0.0167	1.6548	0.9899	0.9798	3.2176
		0.45	0.3185	0.1014	1.9217	0.9334	0.8712	3.4490
		0.50	0.8697	0.7564	3.1416	0.1294	0.0168	3.1416
		0.55	0.3174	0.1007	4.3531	0.9306	0.8660	2.8354
		0.65	0.1289	0.0166	4.6217	0.9884	0.9769	3.0558
		0.75	0.1047	0.0110	4.7124	0.9920	0.9841	3.1416
		0.85	0.1288	0.0166	4.3075	0.9874	0.9750	3.2173
		0.95	0.3128	0.0978	5.1047	0.9200	0.8463	3.4423
		1.00	0.7693	0.5919	6.2832	0.2290	0.0524	3.1416
		1.05	0.3116	0.0971	7.4535	0.9174	0.8416	2.8422
		1.15	0.1285	0.0165	7.7522	0.9859	0.9721	3.0661
		1.25	0.1045	0.0109	7.8540	0.9904	0.9809	3.1416
		1.35	0.1283	0.0165	7.9602	0.9850	0.9701	3.2170
		1.45	0.3067	0.0941	8.2875	0.9076	0.8238	3.4359
		1.50	0.6896	0.4755	9.4248	0.3080	0.0948	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.000	.91	0.05	0.2923	0.0854	1.2891	0.9563	0.9146	2.8599
		0.15	0.1160	0.0134	1.5026	0.9933	0.9866	3.0734
		0.25	0.0940	0.0088	1.5708	0.9956	0.9912	3.1416
		0.35	0.1160	0.0134	1.6390	0.9933	0.9866	3.2098
		0.45	0.2923	0.0854	1.8525	0.9563	0.9146	3.4233
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.2923	0.0854	4.4307	0.9563	0.9146	2.8599
		0.65	0.1160	0.0134	4.6442	0.9933	0.9866	3.0734
		0.75	0.0940	0.0088	4.7124	0.9956	0.9912	3.1416
		0.85	0.1160	0.0134	4.7805	0.9933	0.9866	3.2098
		0.95	0.2923	0.0854	4.9941	0.9563	0.9146	3.4233
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.2923	0.0854	7.5723	0.9563	0.9146	2.8599
		1.15	0.1160	0.0134	7.7858	0.9933	0.9866	3.0734
		1.25	0.0940	0.0088	7.8540	0.9956	0.9912	3.1416
		1.35	0.1160	0.0134	7.9222	0.9933	0.9866	3.2098
		1.45	0.2923	0.0854	8.1357	0.9563	0.9146	3.4233
		1.50	1.0000	1.0000	9.4246	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \beta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.005	.91	0.05	0.2921	0.0853	1.2869	0.9556	0.9133	2.8601
		0.15	0.1159	0.0134	1.5009	0.9929	0.9859	3.0734
		0.25	0.0940	0.0088	1.5708	0.9952	0.9904	3.1416
		0.35	0.1159	0.0134	1.6429	0.9925	0.9850	3.2097
		0.45	0.2904	0.0843	1.8723	0.9503	0.9030	3.4213
		0.50	0.9229	0.8517	3.1416	0.0767	0.0059	3.1416
		0.55	0.2899	0.0841	4.4066	0.9489	0.9005	2.8623
		0.65	0.1158	0.0134	4.6369	0.9918	0.9837	3.0735
		0.75	0.0039	0.0088	4.7124	0.9945	0.9890	3.1416
		0.85	0.1157	0.0134	4.7902	0.9914	0.9828	3.2097
		0.95	0.2021	0.0850	5.0355	0.9437	0.8906	3.4138
		1.00	0.8968	0.7340	6.2832	0.1425	0.0203	3.1416
		1.05	0.2076	0.0827	7.5265	0.9424	0.8882	2.8649
		1.15	0.1156	0.0134	7.7729	0.9907	0.9815	3.0736
		1.25	0.0938	0.0088	7.8540	0.9927	0.9875	3.1416
		1.35	0.1156	0.0134	7.9373	0.9903	0.9806	3.2096
		1.45	0.2857	0.0816	8.1984	0.9374	0.8787	3.4160
		1.50	0.7094	0.5091	9.4248	0.1994	0.0398	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$P = \frac{a \tan \beta}{\epsilon \sin 2\theta}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda^2}$	$\frac{R'}{\lambda}$
.010	.91	0.05	0.2919	0.0852	1.2847	0.9550	0.9120	2.9603
		0.15	0.1159	0.0134	1.4992	0.9926	0.9852	3.0734
		0.25	0.0940	0.0088	1.5708	0.9948	0.9897	3.1416
		0.35	0.1158	0.0134	1.6469	0.9917	0.9835	3.2097
		0.45	0.2883	0.0831	1.8918	0.9444	0.8918	3.4191
		0.50	0.8568	0.7340	3.1416	0.1425	0.0203	3.1416
		0.55	0.2874	0.0826	4.3828	0.9418	0.8870	2.8652
		0.65	0.1156	0.0134	4.6296	0.9904	0.9808	3.0736
		0.75	0.0938	0.0088	4.7124	0.9934	0.9868	3.1416
		0.85	0.1155	0.0133	4.7997	0.9895	0.9791	3.2095
		0.95	0.2835	0.0804	5.0757	0.9319	0.8684	3.4193
		1.00	0.7493	0.5614	6.2832	0.2493	0.0621	3.1416
		1.05	0.2825	0.0798	7.4824	0.9295	0.8640	2.8711
		1.15	0.1153	0.0133	7.7600	0.9882	0.9765	3.0739
		1.25	0.0936	0.0088	7.8540	0.9919	0.9839	3.1416
		1.35	0.1151	0.0132	7.9524	0.9873	0.9747	3.2092
		1.45	0.2783	0.0775	8.2584	0.9204	0.8471	3.4068
		1.50	0.6656	0.4430	9.4248	0.3322	0.1104	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NALC-EL-52195

$$d_s = \frac{\lambda}{2} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.000	.92	0.05	0.2608	0.0680	1.3202	0.9654	0.9320	2.8909
		0.15	0.1026	0.0105	1.5104	0.9947	0.9895	3.0812
		0.25	0.0832	0.0069	1.5708	0.9965	0.9931	3.1416
		0.35	0.1026	0.0105	1.6312	0.9947	0.9895	3.2020
		0.45	0.2608	0.0680	1.8214	0.9654	0.9320	3.3922
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.2608	0.0680	4.4817	0.9654	0.9320	2.8909
		0.65	0.1026	0.0105	4.6520	0.9947	0.9895	3.0812
		0.75	0.0832	0.0069	4.7124	0.9965	0.9931	3.1416
		0.85	0.1026	0.0105	4.7728	0.9947	0.9895	3.2020
		0.95	0.2608	0.0680	4.9630	0.9654	0.9320	3.3922
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.2608	0.0680	7.6033	0.2654	0.9320	2.8909
		1.15	0.1026	0.0105	7.7936	0.9947	0.9895	3.0812
		1.25	0.0832	0.0069	7.8540	0.9965	0.9931	3.1416
		1.35	0.1026	0.0105	7.9143	0.9947	0.9895	3.2020
		1.45	0.2608	0.0680	8.1046	0.9654	0.9320	3.3922
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

p	r	$\frac{ds}{r}$	$ds = \frac{k\sqrt{e - \sin^2\theta}}{\lambda}$		$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$P = \frac{e \tan^3\theta}{e - \sin^2\theta}$		$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R}$
			$\frac{ds}{r}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R'}{R}$
.005	.92	0.05	0.2606	0.0679	1.3179	0.9648	0.9308	2.8911	0.9308	2.8911	0.9308	2.8911
		0.15	0.1026	0.0105	1.5087	0.9944	0.9889	3.0812	0.9889	3.0812	0.9889	3.0812
		0.25	0.0832	0.0069	1.5708	0.9962	0.9924	3.1416	0.9924	3.1416	0.9924	3.1416
		0.35	0.1026	0.0105	1.6351	0.9940	0.9881	3.2013	0.9881	3.2013	0.9881	3.2013
		0.45	0.2592	0.0672	1.8416	0.9599	0.9214	3.3905	0.9214	3.3905	0.9214	3.3905
		0.50	0.9137	0.8249	3.1416	0.0860	0.0074	3.1416	0.0074	3.1416	0.0074	3.1416
		0.55	0.2589	0.0670	4.4371	0.9587	0.9191	2.8929	0.9191	2.8929	0.9191	2.8929
		0.65	0.1025	0.0105	4.6447	0.9934	0.9869	3.0813	0.9869	3.0813	0.9869	3.0813
		0.75	0.0831	0.0069	4.7124	0.9956	0.9911	3.1416	0.9911	3.1416	0.9911	3.1416
		0.85	0.1025	0.0105	4.7823	0.9930	0.9861	3.2013	0.9861	3.2013	0.9861	3.2013
		0.95	0.2574	0.0663	5.0052	0.9539	0.9099	3.3886	0.9099	3.3886	0.9099	3.3886
		1.00	0.8411	0.7074	6.2832	0.1583	0.0250	3.1416	0.0250	3.1416	0.0250	3.1416
		1.05	0.2570	0.0661	7.5567	0.9527	0.9077	2.8950	0.9077	2.8950	0.9077	2.8950
		1.15	0.1024	0.0105	7.7607	0.9925	0.9850	3.0814	0.9850	3.0814	0.9850	3.0814
		1.25	0.0830	0.0069	7.8540	0.9949	0.9898	3.1416	0.9898	3.1416	0.9898	3.1416
		1.35	0.1023	0.0105	7.9295	0.9921	0.9842	3.2013	0.9842	3.2013	0.9842	3.2013
		1.45	0.2554	0.0652	8.1687	0.9481	0.8989	3.3863	0.8989	3.3863	0.8989	3.3863
		1.50	0.7791	0.6070	9.4248	0.2199	0.0484	3.1416	0.0484	3.1416	0.0484	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{\kappa \sqrt{\epsilon - \sin^2 \theta}}{\lambda}$									
$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{ds}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda}$	$\frac{R'}{\lambda}$	
0.010	0.92	0.05	0.2605	0.0678	1.3157	0.9642	0.9296	2.8913	
		0.15	0.1026	0.0105	1.5070	0.9941	0.9883	3.0813	
		0.25	0.0831	0.0069	1.5708	0.9959	0.9918	3.1416	
		0.35	0.1025	0.0105	1.6391	0.9933	0.9867	3.2019	
		0.45	0.2576	0.0663	1.8615	0.9545	0.9111	3.3888	
		0.50	0.8411	0.7074	3.1416	0.1583	0.0250	3.1416	
		0.55	0.2568	0.0660	4.4129	0.9522	0.9066	2.8952	
		0.65	0.1023	0.0105	4.6374	0.9922	0.9844	3.0814	
		0.75	0.0830	0.0069	4.7124	0.9946	0.9892	3.1416	
		0.85	0.1022	0.0105	4.7913	0.9914	0.9828	3.2017	
		0.95	0.2536	0.0643	5.0464	0.9431	0.8894	3.3840	
		1.00	0.7256	0.5265	6.2832	0.2731	0.0746	3.1416	
		1.05	0.2527	0.0639	7.5115	0.9409	0.8853	2.9002	
		1.15	0.1021	0.0104	7.7678	0.9902	0.9805	3.0816	
		1.25	0.0829	0.0069	7.8540	0.9933	0.9866	3.1416	
		1.35	0.1020	0.0104	7.9446	0.9894	0.9790	3.2015	
		1.45	0.2492	0.0521	8.2299	0.9325	0.8695	3.3783	
		1.50	0.6378	0.4068	9.4248	0.3602	0.1297	3.1416	

## REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$ds = \frac{\lambda}{\sqrt{\epsilon - \sin^2 \theta}}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.000	.93	0.05	0.2288	0.0524	1.3514	0.9735	0.9476	2.9222
		0.15	0.0894	0.0080	1.5182	0.9960	0.9920	3.0890
		0.25	0.0724	0.0052	1.5708	0.9974	0.9948	3.1416
		0.35	0.0894	0.0080	1.6234	0.9960	0.9920	3.1942
		0.45	0.2288	0.0524	1.7902	0.9735	0.9476	3.3610
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.2288	0.0524	4.4930	0.9735	0.9476	2.9222
		0.65	0.0894	0.0080	4.6598	0.9960	0.9920	3.0890
		0.75	0.0724	0.0052	4.7124	0.9974	0.9948	3.1416
		0.85	0.0894	0.0080	4.7650	0.9960	0.9920	3.1942
		0.95	0.2288	0.0524	4.9318	0.9735	0.9476	3.3610
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.2288	0.0524	7.6346	0.9735	0.9476	2.9222
		1.15	0.0894	0.0080	7.8014	0.9960	0.9920	3.0890
		1.25	0.0724	0.0052	7.8540	0.9974	0.9948	3.1416
		1.35	0.0894	0.0080	7.9066	0.9960	0.9920	3.1942
		1.45	0.2288	0.0524	8.0734	0.9735	0.9476	3.3610
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \delta}{e - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{e - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.005}$	$\frac{r}{.93}$	$\frac{ds}{.05}$	$\frac{T_n}{.0287}$	$\frac{T_n^2}{.00523}$	$\frac{T_n}{1.3491}$	$\frac{R}{.09729}$	$\frac{R^2}{.009466}$	$\frac{R'}{2.9224}$
		0.15	0.0894	0.0080	1.5165	0.9957	0.9915	3.0890
		0.25	0.0724	0.0052	1.5708	0.9971	0.9942	3.1415
		0.35	0.0894	0.0080	1.6273	0.9954	0.9908	3.1941
		0.45	0.2275	0.0518	1.8107	0.9685	0.9381	3.3597
		0.50	0.9022	0.8139	3.1416	0.0976	0.0095	3.1416
		0.55	0.2273	0.0517	4.4680	0.9675	0.9360	2.9238
		0.65	0.0893	0.0080	4.6525	0.9949	0.9898	3.0891
		0.75	0.0724	0.0052	4.7124	0.9965	0.9931	3.1416
		0.85	0.0893	0.0080	4.7746	0.9945	0.9891	3.1941
		0.95	0.2261	0.0511	4.9748	0.9632	0.9278	3.3581
		1.00	0.8217	0.6752	6.2832	0.1777	0.0316	3.1416
		1.05	0.2258	0.0510	7.5871	0.9622	0.9257	2.9254
		1.15	0.0892	0.0080	7.7884	0.9940	0.9881	3.0891
		1.25	0.0723	0.0052	7.8540	0.9960	0.9919	3.1416
		1.35	0.0892	0.0080	7.9218	0.9937	0.9874	3.1940
		1.45	0.2246	0.0504	8.1386	0.9580	0.9178	3.3562
		1.50	0.7544	0.5691	9.4248	0.2447	0.0599	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$ds = \frac{\pi}{\lambda} \sqrt{\epsilon - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$\frac{P}{0.10}$	$\frac{r}{0.93}$	$\frac{ds}{0.05}$	$\frac{T_n}{0.2286}$	$\frac{T_n^2}{0.0522}$	$\frac{T_n}{1.3468}$	$\frac{R}{0.9724}$	$\frac{R^2}{0.9455}$	$\frac{R'}{2.9225}$
0.15		0.0894		0.0080	1.5148	0.9955	0.9910	3.0890
0.25		0.0724		0.0052	1.5708	0.9968	0.9936	3.1416
0.35		0.0893		0.0080	1.6313	0.9948	0.9896	3.1941
0.45		0.2263		0.0512	1.8310	0.9637	0.9288	3.3583
0.50		0.0217		0.6752	3.1416	0.1777	0.0316	3.1416
0.55		0.2257		0.0509	4.4433	0.9616	0.9247	2.9256
0.65		0.0892		0.0080	4.6451	0.9938	0.9876	3.0892
0.75		0.0723		0.0052	7.7124	0.9957	0.9914	3.1416
0.85		0.0891		0.0079	4.7842	0.9931	0.9862	3.1940
0.95		0.2231		0.0498	5.0167	0.9535	0.9091	3.3544
1.00		0.6972		0.4851	6.2832	0.3016	0.0910	3.1416
1.05		0.2224		0.0495	7.5410	0.9515	0.9054	2.9237
1.15		0.0890		0.0079	7.7755	0.9920	0.9842	3.0893
1.25		0.0722		0.0052	7.8540	0.9945	0.9891	3.1416
1.35		0.0889		0.0079	7.9370	0.9914	0.9828	3.1933
1.45		0.2195		0.0432	8.2012	0.9439	0.8910	3.3496
1.50		0.6054		0.3665	9.4248	0.3929	0.1544	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{k\sqrt{\epsilon - \sin^2\theta}}{\lambda}$$

$$F = \frac{\epsilon \tan\theta}{\epsilon - \sin^2\theta}$$

$\frac{p}{r}$	$\frac{d_s}{r}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n^2}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R^2}$	$\frac{R'}{R'}$
1.000	0.94	0.1965	0.0386	1.3829	0.9805	0.9614	2.9536
	0.15	0.0763	0.0058	1.5259	0.9971	0.9942	3.0967
	0.25	0.0618	0.0038	1.5708	0.9981	0.9962	3.1416
	0.35	0.0763	0.0058	1.6157	0.9971	0.9942	3.1865
	0.45	0.1965	0.0386	1.7587	0.9805	0.9614	3.3295
	0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
	0.55	0.1965	0.0386	4.5244	0.9805	0.9614	2.9536
	0.65	0.0763	0.0058	4.6675	0.9971	0.9942	3.0967
	0.75	0.0618	0.0038	4.7124	0.9981	0.9962	3.1416
	0.85	0.0763	0.0058	4.7573	0.9971	0.9942	3.1865
	0.95	0.1965	0.0386	4.9003	0.9805	0.9614	3.3295
	1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
	1.05	0.1965	0.0386	7.6660	0.9805	0.9614	2.9536
	1.15	0.0763	0.0058	7.8091	0.9971	0.9942	3.0967
	1.25	0.0618	0.0038	7.8540	0.9981	0.9962	3.1416
	1.35	0.0763	0.0058	7.8988	0.9971	0.9942	3.1865
	1.45	0.1965	0.0386	8.0419	0.9805	0.9614	3.3295
	1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52185

$$P = \frac{\tan \delta}{1 - \sin^2 \theta}$$

$$d_s = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
0.05	0.94	0.05	0.1964	0.0386	1.3805	0.9800	0.9605	2.9937
		0.15	0.0763	0.0058	1.5242	0.9969	0.9937	3.0967
		0.25	0.0618	0.0038	1.5708	0.9978	0.9957	3.1416
		0.35	0.0763	0.0058	1.6195	0.9966	0.9931	3.1864
		0.45	0.1955	0.0382	1.7796	0.9762	0.9530	3.3286
		0.50	0.8872	0.7871	3.1416	0.1125	0.0127	3.1416
		0.55	0.1953	0.0382	4.4990	0.9753	0.9512	2.9548
		0.65	0.0762	0.0058	4.6602	0.9961	0.9923	3.0968
		0.75	0.0617	0.0038	4.7124	0.9974	0.9947	3.1416
		0.85	0.0762	0.0058	4.7669	0.9958	0.9917	3.1864
		0.95	0.1944	0.0378	4.9440	0.9716	0.9439	3.3274
		1.00	0.7972	0.6356	6.2832	0.2023	0.0409	3.1416
		1.05	0.1942	0.0377	7.6178	0.9706	0.9421	2.9561
		1.15	0.0762	0.0058	7.7961	0.9954	0.9908	3.0968
		1.25	0.0617	0.0038	7.8540	0.9969	0.9938	3.1416
		1.35	0.0761	0.0058	7.9141	0.9951	0.9902	3.1863
		1.45	0.1932	0.0373	8.1083	0.9670	0.9351	3.3259
		1.50	0.7238	0.5239	9.4248	0.2755	0.0759	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$p = \frac{\epsilon \tan \theta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

P	r	$\frac{d_s}{\lambda}$	$\frac{T_n}{T_n}$	$\frac{T_n^2}{T_n}$	$\frac{T_n}{T_n}$	$\frac{R}{R}$	$\frac{R^2}{R}$	$\frac{R^0}{R}$
.010	.94	0.05	0.1963	0.0385	1.3782	0.9796	0.9595	2.9538
		0.15	0.0763	0.0058	1.5225	0.9966	0.9933	3.0957
		0.25	0.0618	0.0038	1.5708	0.9976	0.9952	3.1416
		0.35	0.0762	0.0058	1.6236	0.9961	0.9921	3.1864
		0.45	0.1046	0.0378	1.8002	0.9720	0.9448	3.3275
		0.50	0.7972	0.6356	3.1416	0.2023	0.0409	3.1416
		0.55	0.1941	0.0377	4.4739	0.9702	0.9412	2.9562
		0.65	0.0761	0.0058	4.6523	0.9952	0.9904	3.0968
		0.75	0.0617	0.0038	4.7124	0.9956	0.9923	3.1416
		0.85	0.0761	0.0058	4.7765	0.9948	0.9892	3.1863
		0.95	0.1921	0.0369	4.9868	0.9630	0.9274	3.3244
		1.00	0.6627	0.4392	6.2832	0.3365	0.1131	3.1416
		1.05	0.1915	0.0367	7.5707	0.9613	0.9241	2.9595
		1.15	0.0760	0.0058	7.7831	0.9937	0.9875	3.0970
		1.25	0.0616	0.0038	7.8540	0.9957	0.9914	3.1416
		1.35	0.0759	0.0058	7.9293	0.9931	0.9863	3.1862
		1.45	0.1892	0.0358	8.1722	0.9546	0.9112	3.3206
		1.50	0.5669	0.3214	9.4248	0.4315	0.1863	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

$$d_s = \frac{\lambda}{\sqrt{\epsilon - \sin^2 \theta}}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.000	.95	0.05	0.1638	0.0268	1.4144	0.9865	0.9732	2.9852
		0.15	0.0633	0.0040	1.5336	0.9980	0.9960	3.1044
		0.25	0.0512	0.0026	1.5708	0.9987	0.9974	3.1416
		0.35	0.0633	0.0040	1.6080	0.9980	0.9950	3.1788
		0.45	0.1638	0.0268	1.7272	0.9865	0.9732	3.2980
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.1638	0.0268	4.5560	0.9865	0.9732	2.9852
		0.65	0.0633	0.0040	4.6752	0.9980	0.9950	3.1044
		0.75	0.0512	0.0026	4.7124	0.9987	0.9974	3.1416
		0.85	0.0633	0.0040	4.7496	0.9980	0.9960	3.1788
		0.95	0.1638	0.0268	4.8688	0.9865	0.9732	3.2980
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.1638	0.0268	7.6975	0.9865	0.9732	2.9852
		1.15	0.0633	0.0040	7.8168	0.9980	0.9960	3.1044
		1.25	0.0512	0.0026	7.8540	0.9987	0.9974	3.1416
		1.35	0.0633	0.0040	7.8912	0.9980	0.9960	3.1788
		1.45	0.1638	0.0268	8.0104	0.9865	0.9732	3.2980
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

$$P = \frac{\epsilon \tan \delta}{\epsilon - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.005	.95	0.05	0.1638	0.0268	1.4120	0.9861	0.9724	2.9852
		0.15	0.0633	0.0040	1.5319	0.9978	0.9956	3.1044
		0.25	0.0512	0.0026	1.5708	0.9985	0.9970	3.1416
		0.35	0.0633	0.0040	1.5120	0.9976	0.9951	3.1788
		0.45	0.1632	0.0266	1.7483	0.9829	0.9660	3.2374
		0.50	0.3671	0.7518	3.1416	0.1327	0.0176	3.1416
		0.55	0.1630	0.0266	4.5302	0.9821	0.9645	2.9360
		0.65	0.0632	0.0040	4.6678	0.9972	0.9944	3.1044
		0.75	0.0512	0.0026	4.7124	0.9981	0.9962	3.1416
		0.85	0.0632	0.0040	4.7593	0.9970	0.9939	3.1788
		0.95	0.1624	0.0264	4.9131	0.9789	0.9583	3.2965
		1.00	0.7653	0.5857	6.2832	0.2343	0.0549	3.1416
		1.05	0.1622	0.0263	7.6486	0.9781	0.9567	2.9869
		1.15	0.0632	0.0040	7.8037	0.9966	0.9932	3.1044
		1.25	0.0512	0.0026	7.8540	0.9977	0.9954	3.1416
		1.35	0.0632	0.0040	7.9065	0.9963	0.9927	3.1787
		1.45	0.1615	0.0261	8.0777	0.9750	0.9507	3.2954
		1.50	0.6849	0.4691	9.4248	0.3145	0.0989	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{e - \sin^2 \theta}$$

$$ds = \frac{x \sqrt{e - \sin^2 \theta}}{\lambda}$$

P	$\frac{x}{\lambda}$	$\frac{C_S}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda^2}$	$\frac{R'}{\lambda}$
.010	.95	0.05	0.1637	0.0268	1.4097	0.9857	0.9716	2.9853
		0.15	0.0633	0.0040	1.5372	0.9976	0.9953	3.1044
		0.25	0.0512	0.0026	1.5706	0.9983	0.9966	3.1416
		0.35	0.0632	0.0040	1.6160	0.9971	0.9943	3.1788
		0.45	0.1525	0.0264	1.7692	0.9793	0.9530	3.2966
		0.50	0.7553	0.5857	3.1416	0.2343	0.0549	3.1416
		0.55	0.1521	0.0263	4.5047	0.9777	0.9560	2.9870
		0.65	0.0632	0.0040	4.6604	0.9964	0.9928	3.1045
		0.75	0.0612	0.0026	4.7124	0.9975	0.9950	3.1416
		0.85	0.0631	0.0040	4.7689	0.9959	0.9919	3.1787
		0.95	0.1606	0.0258	4.9566	0.9716	0.9441	3.2942
		1.00	0.6197	0.3841	5.2832	0.3795	0.1440	3.1416
		1.05	0.1602	0.0257	7.5008	0.9702	0.9412	2.9895
		1.15	0.0631	0.0040	7.7907	0.9952	0.9904	3.1046
		1.25	0.0511	0.0025	7.8540	0.9967	0.9924	3.1416
		1.35	0.0630	0.0040	7.9218	0.9947	0.9894	3.1736
		1.45	0.1584	0.0251	8.1428	0.9644	0.9301	3.2912
		1.50	0.5206	0.2710	9.4248	0.4782	0.2287	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$d_s = \frac{x \sqrt{4 - \sin^2 \theta}}{\lambda}$$

$$P = \frac{4 \tan \theta}{4 - \sin^2 \theta}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
.000	.96	0.05	0.1310	0.0172	1.4459	0.9914	0.9828	3.0167
		0.15	0.0504	0.0025	1.5412	0.9987	0.9975	3.1120
		0.25	0.0408	0.0017	1.5708	0.9992	0.9983	3.1416
		0.35	0.0504	0.0025	1.6004	0.9987	0.9975	3.1712
		0.45	0.1310	0.0172	1.6357	0.9914	0.9828	3.2665
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.1310	0.0172	4.5875	0.9914	0.9828	3.0167
		0.65	0.0504	0.0025	4.6826	0.9987	0.9975	3.1120
		0.75	0.0408	0.0017	4.7124	0.9992	0.9983	3.1416
		0.85	0.0504	0.0025	4.7420	0.9987	0.9975	3.1712
		0.95	0.1310	0.0172	4.8373	0.9914	0.9828	3.2665
		1.00	1.0000	1.0000	5.2832	0.0000	0.0000	1.5708
		1.05	0.1310	0.0172	7.7291	0.9914	0.9828	3.0167
		1.15	0.0504	0.0025	7.8243	0.9987	0.9975	3.1120
		1.25	0.0408	0.0017	7.8540	0.9992	0.9983	3.1416
		1.35	0.0504	0.0025	7.8836	0.9987	0.9975	3.1712
		1.45	0.1310	0.0172	7.9789	0.9914	0.9828	3.2665
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NAEC-EL-52195

$$c_s = \frac{x}{\lambda} \sqrt{e - \sin^2 \theta}$$

$$p = \frac{e \tan \theta}{1 - \sin^2 \theta}$$

$\frac{p}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda^2}$	$\frac{R'}{\lambda}$
.005	.96	0.05	0.1310	0.0171	1.4435	0.9911	0.9822	3.0167
		0.15	0.0504	0.0025	1.5395	0.9986	0.9972	3.1120
		0.25	0.0408	0.0017	1.5703	0.9990	0.9980	3.1416
		0.35	0.0504	0.0025	1.6044	0.9984	0.9968	3.1712
		0.45	0.1206	0.0171	1.7170	0.9885	0.9770	3.2651
		0.50	0.8286	0.7012	3.1416	0.0000	0.0000	3.1416
		0.55	0.1305	0.0170	4.5614	0.9878	0.9756	3.0172
		0.65	0.0504	0.0025	4.6754	0.9981	0.9962	3.1120
		0.75	0.0408	0.0017	4.7124	0.9987	0.9974	3.1416
		0.85	0.0504	0.0025	4.7517	0.9979	0.9958	3.1712
		0.95	0.1300	0.0169	4.8821	0.9852	0.9707	3.2654
		1.00	0.7219	0.5212	6.2832	0.2777	0.0771	3.1416
		1.05	0.1299	0.0169	7.5796	0.9846	0.9695	3.0179
		1.15	0.0503	0.0025	7.8113	0.9976	0.9952	3.1120
		1.25	0.0408	0.0017	7.8540	0.9984	0.9967	3.1416
		1.35	0.0503	0.0025	7.8930	0.9974	0.9948	3.1712
		1.45	0.1294	0.0168	8.0470	0.9821	0.9645	3.2647
		1.50	0.6338	0.4017	9.4248	0.2657	0.0708	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$ds = \frac{x\sqrt{\epsilon - \sin^2\theta}}{\lambda}$ $p = \frac{\epsilon \tan\delta}{\epsilon - \sin^2\theta}$									
P	r	$\frac{ds}{\lambda}$	$T_n$	$T_n^2$	$\frac{T_n}{T_n}$	R	$R^2$	$\frac{R'}{R}$	$\frac{R'}{R^2}$
0.010	0.95	0.05	0.1309	0.0171	1.4411	0.9907	0.9815	3.0168	3.0168
		0.15	0.0504	0.0025	1.5377	0.9984	0.9969	3.1120	3.1120
		0.25	0.0408	0.0017	1.5708	0.9988	0.9977	3.1416	3.1416
		0.35	0.0504	0.0025	1.6084	0.9980	0.9961	3.1712	3.1712
		0.45	0.1301	0.0169	1.7382	0.9856	0.9713	3.2655	3.2655
		0.50	0.7219	0.5212	3.1416	0.2777	0.0771	3.1416	3.1416
		0.55	0.1299	0.0169	4.5356	0.9843	0.9688	3.0180	3.0180
		0.55	0.0503	0.0025	4.6680	0.9975	0.9949	3.1170	3.1170
		0.75	0.0407	0.0017	4.7124	0.9982	0.9964	3.1416	3.1416
		0.85	0.0503	0.0025	4.7612	0.9971	0.9942	3.1711	3.1711
		0.95	0.1288	0.0166	4.9262	0.9793	0.9591	3.1638	3.1638
		1.00	0.5648	0.3190	6.2332	0.4346	0.1889	3.1416	3.1416
		1.05	0.1235	0.0155	7.6310	0.9751	0.9567	3.0198	3.0198
		1.15	0.0502	0.0025	7.7982	0.9965	0.9990	3.1121	3.1121
		1.25	0.0407	0.0017	7.8540	0.9976	0.9991	3.1416	3.1416
		1.35	0.0502	0.0025	7.9142	0.9961	0.9922	3.1711	3.1711
		1.45	0.1273	0.0162	8.1132	0.9734	0.9475	3.2616	3.2616
		1.50	0.4537	0.2150	9.4248	0.5353	0.2866	3.1416	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NAIC-EL-52195

$$P = \frac{e \tan \delta}{d \cdot \sin^2 \theta}$$

$$ds = \frac{\lambda \sqrt{1 - \sin^2 \theta}}{\lambda}$$

P	r	ds	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	R	R <sup>2</sup>	R'
0.00	0.97	0.05	0.0981	0.0096	1.4774	0.9952	0.9904	3.0482
		0.15	0.0376	0.0014	1.5437	0.9993	0.9986	3.1195
		0.25	0.0304	0.0009	1.5758	0.9995	0.9991	3.1416
		0.35	0.0376	0.0014	1.5929	0.9993	0.9986	3.1637
		0.45	0.0981	0.0096	1.6652	0.9952	0.9904	3.2350
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5738
		0.55	0.0981	0.0096	4.6189	0.9952	0.9904	3.0482
		0.65	0.0376	0.0014	4.6933	0.9993	0.9986	3.1195
		0.75	0.0304	0.0009	4.7124	0.9995	0.9991	3.1416
		0.85	0.0376	0.0014	4.7345	0.9993	0.9986	3.1637
		0.95	0.0981	0.0096	4.8058	0.9952	0.9904	3.2350
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5738
		1.05	0.0981	0.0096	7.7605	0.9993	0.9904	3.0482
		1.15	0.0376	0.0014	7.8319	0.9993	0.9986	3.1195
		1.25	0.0304	0.0009	7.8540	0.9995	0.9991	3.1416
		1.25	0.0376	0.0014	7.8761	0.9993	0.9986	3.1637
		1.45	0.0981	0.0096	7.9474	0.9952	0.9904	3.2350
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5738

## REPORT NO. NALC-EL-52195

P	r	d <sub>s</sub>	$d_s = \frac{\lambda \sqrt{e - \sin^2 \theta}}{\lambda}$		$T_n^2$	$T_n$	$P = \frac{e \tan \theta}{e - \sin^2 \theta}$		$R$	$R^2$	$R'$
			$T_n^2$	$T_n$							
.005	.9"	0.05	0.0081	0.0981	0.0096	1.4750	0.9949	0.9899	3.0482	3.1195	3.1416
		0.15	0.0376	0.0376	0.0014	1.5470	0.9992	0.9984	3.1195	3.1416	3.1416
		0.25	0.0304	0.0304	0.0009	1.5708	0.9994	0.9988	3.1416	3.1416	3.1416
		0.35	0.0376	0.0376	0.0014	1.5969	0.9990	0.9981	3.1537	3.1537	3.1537
		0.45	0.0979	0.0979	0.0096	1.6857	0.9930	0.9860	3.2348	3.2348	3.2348
		0.50	0.7349	0.7349	0.6319	3.1416	0.0000	0.0000	3.1416	3.1416	3.1416
		0.55	0.0978	0.0978	0.0096	4.5927	0.9925	0.9850	3.0485	3.0485	3.0485
		0.65	0.0376	0.0376	0.0014	4.6829	0.9988	0.9976	3.1195	3.1195	3.1195
		0.75	0.0304	0.0304	0.0009	4.7124	0.9992	0.9984	3.1416	3.1416	3.1416
		0.85	0.0376	0.0376	0.0014	4.7442	0.9987	0.9973	3.1637	3.1637	3.1637
		0.95	0.0975	0.0975	0.0095	4.8511	0.9905	0.9812	3.2344	3.2344	3.2344
		1.00	0.6596	0.6596	0.4331	6.2132	0.0000	0.0000	3.1416	3.1416	3.1416
		1.05	0.0975	0.0975	0.0095	7.7106	0.9901	0.9802	3.0489	3.0489	3.0489
		1.15	0.0376	0.0376	0.0014	7.8188	0.9985	0.9969	3.1195	3.1195	3.1195
		1.25	0.0304	0.0304	0.0009	7.8540	0.9989	0.9979	3.1416	3.1416	3.1416
		1.35	0.0376	0.0376	0.0014	7.8915	0.9983	0.9966	3.1637	3.1637	3.1637
		1.45	0.0972	0.0972	0.0094	8.0162	0.9881	0.9764	3.2339	3.2339	3.2339
		1.50	0.5637	0.5637	0.3177	9.4248	0.4360	0.1901	3.1416	3.1416	3.1416

## REPORT NO. NADC-EL-52195

P	r	$\frac{d_s}{\lambda}$	$d_s = \frac{\lambda}{\pi} \sqrt{1 - \sin^2 \theta}$		$T_n^2$	$T_n$	$p = \frac{e \tan \theta}{d - \sin 2\theta}$		$R$	$R^2$	$R'$
			$T_n^2$	$T_n$							
.010	.97	0.05	0.0081	0.0304	0.0036	1.4726	0.9947	0.9894	0.9947	0.9894	3.0482
		0.15	0.0376	0.0304	0.0014	1.5453	0.9991	0.9981	0.9991	0.9981	3.1195
		0.25	0.0304	0.0304	0.0009	1.5708	0.9993	0.9986	0.9993	0.9986	3.1416
		0.35	0.0376	0.0376	0.0014	1.6009	0.9988	0.9976	0.9988	0.9976	3.1637
		0.45	0.0976	0.0976	0.0095	1.7071	0.9908	0.9816	0.9908	0.9816	3.2344
		0.50	0.6596	0.6596	0.4351	3.1416	0.9000	0.8000	0.9000	0.8000	3.1416
		0.55	0.0974	0.0974	0.0095	4.5566	0.9898	0.9797	0.9898	0.9797	3.0489
		0.65	0.0375	0.0375	0.0014	4.6755	0.9983	0.9967	0.9983	0.9967	3.1195
		0.75	0.0304	0.0304	0.0009	4.7124	0.9988	0.9976	0.9988	0.9976	3.1416
		0.85	0.0376	0.0376	0.0014	4.7539	0.9981	0.9961	0.9981	0.9961	3.1637
		0.95	0.0968	0.0968	0.0094	4.8957	0.9860	0.9723	0.9860	0.9723	3.2342
		1.00	0.4920	0.4920	0.2471	6.2832	0.5075	0.2575	0.5075	0.2575	3.1416
		1.05	0.0966	0.0966	0.0093	7.6614	0.9851	0.9704	0.9851	0.9704	3.0501
		1.15	0.0375	0.0375	0.0014	7.8057	0.9976	0.9952	0.9976	0.9952	3.1195
		1.25	0.0304	0.0304	0.0009	7.8540	0.9983	0.9967	0.9983	0.9967	3.1416
		1.35	0.0375	0.0375	0.0014	7.9068	0.9973	0.9947	0.9973	0.9947	3.1636
		1.45	0.0957	0.0957	0.0092	8.0834	0.9815	0.9633	0.9815	0.9633	3.2318
		1.50	0.3923	0.3923	0.1538	9.4248	0.5070	0.2585	0.5070	0.2585	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52195

$$P = \frac{s \tan \theta}{e - \sin 2\theta}$$

$$ds = \frac{\lambda}{\pi} \sqrt{e - \sin 2\theta}$$

P	r	ds	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	R	R <sup>2</sup>	R'
0.00	0.98	0.05	0.0652	0.0043	1.5087	0.9979	0.9957	3.0795
		0.15	0.0250	0.0006	1.5561	0.9997	0.9994	3.1269
		0.25	0.0202	0.0004	1.5708	0.9998	0.9996	3.1416
		0.35	0.0250	0.0006	1.5855	0.9997	0.9994	3.1563
		0.45	0.0652	0.0043	1.6329	0.9979	0.9957	3.2037
		0.50	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
		0.55	0.0652	0.0043	4.6303	0.9979	0.9957	3.0795
		0.65	0.0250	0.0006	4.6977	0.9997	0.9994	3.1269
		0.75	0.0202	0.0004	4.7124	0.9998	0.9996	3.1416
		0.85	0.0250	0.0006	4.7271	0.9997	0.9994	3.1563
		0.95	0.0652	0.0043	4.7745	0.9979	0.9957	3.2037
		1.00	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
		1.05	0.0652	0.0043	7.7919	0.9979	0.9957	3.0795
		1.15	0.0250	0.0006	7.8393	0.9997	0.9994	3.1269
		1.25	0.0202	0.0004	7.8540	0.9998	0.9996	3.1416
		1.35	0.0250	0.0006	7.8687	0.9997	0.9994	3.1563
		1.45	0.0652	0.0043	7.9161	0.9979	0.9957	3.2037
		1.50	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NAEC-EL-52195

$$P = \frac{e \tan \theta}{e \sin \theta}$$

$$ds = \frac{K \sqrt{e - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.005}$	$\frac{r}{.98}$	$\frac{d_s}{.05}$	$\frac{T_n}{.0652}$	$\frac{T_n^2}{.0043}$	$\frac{T_n}{1.5063}$	$\frac{R}{.9977}$	$\frac{R^2}{.9954}$	$\frac{R'}{3.0795}$
		0.15	0.0250	0.0006	1.5544	0.9996	0.9992	3.1269
		0.25	0.0202	0.0004	1.5708	0.9997	0.9994	3.1416
		0.35	0.0250	0.0006	1.5895	0.9995	0.9990	3.1563
		0.45	0.0651	0.0042	1.6545	0.9964	0.9928	3.2036
		0.50	0.7200	0.5184	3.1416	0.0000	0.0000	3.1416
		0.55	0.0651	0.0042	4.6239	0.9961	0.9921	3.0797
		0.65	0.0250	0.0006	4.5903	0.9994	0.9987	3.1269
		0.75	0.0202	0.0004	6.7124	0.9996	0.9991	3.1416
		0.85	0.0250	0.0006	4.7368	0.9993	0.9986	3.1563
		0.95	0.0650	0.0042	4.8200	0.9948	0.9895	3.2033
		1.00	0.5625	0.3164	6.2832	0.0000	0.0000	3.1416
		1.05	0.0649	0.0042	7.7416	0.9944	0.9889	3.0799
		1.15	0.0249	0.0006	7.3262	0.9991	0.9983	3.1269
		1.25	0.0202	0.0004	7.8540	0.9994	0.9988	3.1416
		1.35	0.0249	0.0006	7.8840	0.9990	0.9981	3.1562
		1.45	0.0648	0.0042	7.9854	0.9931	0.9863	3.2031
		1.50	0.4615	0.2130	9.4248	0.0000	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-62195

$$\theta = \frac{\sin \delta}{\sin \theta}$$

$$d_s = \frac{\lambda}{\sqrt{1 - \sin^2 \theta}}$$

P	r	d <sub>s</sub>	T <sub>n</sub>	T <sub>n</sub> <sup>2</sup>	T <sub>n</sub>	H	R <sup>2</sup>	R'
0.010	0.98	0.05	0.0652	0.0043	1.5030	0.9975	0.9951	3.0795
		0.15	0.0250	0.0006	1.5527	0.9995	0.9991	3.1269
		0.25	0.0202	0.0004	1.5708	0.9996	0.9992	3.1416
		0.35	0.0250	0.0006	1.5935	0.9993	0.9987	3.1563
		0.45	0.0650	0.0042	1.6761	0.9949	0.9899	3.2034
		0.50	0.5625	0.3184	3.1416	0.0000	0.0000	3.1416
		0.55	0.0649	0.0042	4.5976	0.9943	0.9886	3.0799
		0.65	0.0249	0.0006	4.6829	0.9991	0.9981	3.1269
		0.75	0.0202	0.0004	4.7124	0.9993	0.9986	3.1416
		0.85	0.0249	0.0006	4.7484	0.9989	0.9977	3.1562
		0.95	0.0645	0.0042	4.8651	0.9917	0.9835	3.2027
		1.00	0.3912	0.1531	5.2832	0.5084	0.3702	3.1416
		1.35	0.0644	0.0042	7.6919	0.9911	0.9823	3.0806
		1.15	0.0249	0.0006	7.8131	0.9986	0.9972	3.1270
		1.25	0.0202	0.0004	7.8540	0.9990	0.9980	3.1416
		1.35	0.0249	0.0006	7.8994	0.9984	0.9968	3.1562
		1.45	0.0639	0.0041	9.0534	0.9886	0.9774	3.2018
		1.50	0.2999	0.0899	9.4248	0.6097	0.4895	3.1416

# Aeronautical Electronic and Electrical Laboratory

## REPORT NO. NADC-EL-52185

$$P = \frac{c \tan \theta}{d - \sin^2 \theta}$$

$$ds = \frac{\pi \sqrt{s - \sin^2 \theta}}{\lambda}$$

$\frac{P}{.000}$	$\frac{r}{.000}$	$\frac{ds}{.000}$	$\frac{T_n}{.000}$	$\frac{T_n^2}{.000}$	$\frac{T_n^3}{.000}$	$\frac{R}{.000}$	$\frac{R^2}{.000}$	$\frac{R^3}{.000}$
0.05	0.05	0.0124	0.0325	0.0011	1.5399	0.9995	0.9989	3.1107
0.15	0.15	0.0124	0.0325	0.0011	1.5635	0.9999	0.9998	3.1343
0.25	0.25	0.0101	0.0325	0.0011	1.5708	0.9999	0.9999	3.1416
0.35	0.35	0.0124	0.0325	0.0011	1.5781	0.9999	0.9998	3.1489
0.45	0.45	0.0325	0.0325	0.0011	1.6017	0.9995	0.9989	3.1725
0.50	0.50	1.0000	1.0000	1.0000	3.1416	0.0000	0.0000	1.5708
0.55	0.55	0.0325	0.0325	0.0011	4.6815	0.9995	0.9989	3.1107
0.65	0.65	0.0124	0.0325	0.0011	4.7051	0.9999	0.9998	3.1343
0.75	0.75	0.0101	0.0325	0.0011	4.7124	0.9999	0.9999	3.1416
0.85	0.85	0.0124	0.0325	0.0011	4.7197	0.9999	0.9998	3.1489
0.95	0.95	0.0325	0.0325	0.0011	4.7433	0.9995	0.9989	3.1725
1.00	1.00	1.0000	1.0000	1.0000	6.2832	0.0000	0.0000	1.5708
1.05	1.05	0.0325	0.0325	0.0011	7.8231	0.9995	0.9989	3.1107
1.15	1.15	0.0124	0.0325	0.0011	7.8467	0.9999	0.9998	3.1343
1.25	1.25	0.0101	0.0325	0.0011	7.8540	0.9999	0.9999	3.1416
1.35	1.35	0.0124	0.0325	0.0011	7.8613	0.9999	0.9998	3.1489
1.45	1.45	0.0325	0.0325	0.0011	7.8849	0.9995	0.9989	3.1725
1.50	1.50	1.0000	1.0000	1.0000	9.4248	0.0000	0.0000	1.5708

## REPORT NO. NADC-EL-52195

$$P = \frac{e \tan \theta}{d - \sin^2 \theta}$$

$$d_s = \frac{x \sqrt{e - \sin^2 \theta}}{\lambda}$$

$\frac{P}{\lambda}$	$\frac{r}{\lambda}$	$\frac{d_s}{\lambda}$	$\frac{T_n}{\lambda}$	$\frac{T_n^2}{\lambda^2}$	$\frac{T_n}{\lambda}$	$\frac{R}{\lambda}$	$\frac{R^2}{\lambda^2}$	$\frac{R'}{\lambda}$
0.05	0.99	0.05	0.0325	0.0011	1.5375	0.9994	0.9988	3.1107
		0.15	0.0124	0.0002	1.5518	0.9999	0.9998	3.1343
		0.25	0.0100	0.0001	1.5708	0.9999	0.9998	3.1416
		0.35	0.0124	0.0002	1.5821	0.9998	0.9997	3.1489
		0.45	0.0325	0.0011	1.6234	0.9987	0.9975	3.1725
		0.50	0.5613	0.3151	3.1416	0.0000	0.0000	3.1416
		0.55	0.0325	0.0011	4.6549	0.9986	0.9971	3.1107
		0.65	0.0124	0.0002	4.6977	0.9998	0.9995	3.1343
		0.75	0.0100	0.0001	4.7124	0.9998	0.9997	3.1416
		0.85	0.0124	0.0002	4.7294	0.9997	0.9994	3.1489
		0.95	0.0324	0.0011	4.7891	0.9979	0.9958	3.1774
		1.00	0.3901	0.1522	6.2832	0.0000	0.0000	3.1416
		1.05	0.0324	0.0011	7.7725	0.9977	0.9953	3.1108
		1.15	0.0124	0.0002	7.8336	0.9996	0.9993	3.1343
		1.25	0.0100	0.0001	7.8540	0.9998	0.9995	3.1416
		1.35	0.0124	0.0002	7.8767	0.9996	0.9992	3.1489
		1.45	0.0323	0.0010	7.9546	0.9971	0.9942	3.1723
		1.50	0.2990	0.0894	9.4248	0.0000	0.0000	3.1416

# Aeronautical Electronic and Electrical Laboratory

REPORT NO. NADC-EL-52185

$$p = \frac{4 \tan^2 \theta}{4 - \sin^2 \theta}$$

$$ds = \frac{x}{\lambda} \sqrt{1 - \sin^2 \theta}$$

P	r	ds	Tn	Tn <sup>2</sup>	Tn	R	R <sup>2</sup>	R'
0.10	.99	0.05	0.0325	0.0011	1.5350	0.9993	0.9986	3.1107
		0.15	0.0124	0.0002	1.5601	0.9999	0.9997	3.1343
		0.25	0.0100	0.0001	1.5738	0.9999	0.9997	3.1416
		0.35	0.0124	0.0002	1.5351	0.9998	0.9995	3.1489
		0.45	0.0324	0.0011	1.6451	0.9980	0.9960	3.1724
		0.50	0.3901	0.1522	3.1416	0.0000	0.0000	3.1416
		0.55	0.0324	0.0010	4.6235	0.9977	0.9953	3.1108
		0.65	0.0124	0.0002	4.6903	0.9996	0.9992	3.1243
		0.75	0.0100	0.0001	4.7124	0.9997	0.9994	3.1416
		0.85	0.0124	0.0002	4.7391	0.9995	0.9990	3.1489
		0.95	0.0323	0.0010	4.8245	0.9964	0.9928	3.1721
		1.00	0.2423	0.0587	6.2832	0.0000	0.0000	3.1416
		1.05	0.0322	0.0010	7.7224	0.9961	0.9921	3.1111
		1.15	0.0124	0.0002	7.8205	0.9994	0.9987	3.1343
		1.25	0.0100	0.0001	7.8540	0.9996	0.9991	3.1416
		1.35	0.0124	0.0002	7.8920	0.9993	0.9985	3.1489
		1.45	0.0320	0.0010	8.0253	0.9948	0.9897	3.1717
		1.50	3.1757	0.0309	9.4248	0.8241	0.6791	3.1416

# Aeronautical Electronic and Electrical Laboratory

## DISTRIBUTION LIST

This report is being distributed to the following indicated activities for information, as directed by Bureau of Aeronautics letter Aer-EL4113 J16/7 serial 97011 of 24 August 1951 and subsequent revisions, to Commander, U. S. Naval Air Development Center, Johnsville, Pennsylvania.

Activity	No. of Copies	Activity	No. of Copies
Chief of Naval Operations		RADC, Griffiss AFB, Rome, N. Y.	1
OP-53 . . . . .	1	Air University Library, Maxwell	
OP-42 . . . . .	1	AFB, Ala. . . . .	1
OP-341D . . . . .	2	ARDC, Baltimore, Md., Code 6DDE	1
OP-551 . . . . .	1	Signal Corps, Eng Lab, Fort	
Bureau of Aeronautics		Monmouth, N. J. . . . .	1
TD-414 . . . . .	2	AFMTC, Patrick AFB, Fla., Tech	
EL-21 . . . . .	2	Library. . . . .	1
Bureau of Ships		INSORD, Applied Physics Lab, John	
Code 11 . . . . .	1	Hopkins University, Silver Spring,	
Code 911 . . . . .	1	Md. . . . .	1
Code 353 . . . . .	1	NACA, Langley Field, Va., Mr. R. A.	
Bureau of Standards		Gardiner, Instrument Research Div.	1
Central Radio Propagation Lab . .	1	BAGR-CD, Dayton, Ohio	
Bureau of Ordnance		WCLRA-1 . . . . .	1
AD-3 . . . . .	1	WCLNC . . . . .	1
Re8e . . . . .	1	WCLCC 2 . . . . .	1
NATESTCEN, Patuxent, Md., ET Div .	3	WCLEL . . . . .	1
NAMTC, Point Mugu, Calif., Code 324.	2	ASTIA . . . . .	1
NRL, Washington, D. C.		BAGR, Los Angeles, Calif. . . . .	1
Code 3240 . . . . .	1	BAR, Bethpage, N. Y., for transmittal	
Code 1140 . . . . .	1	to	
USAF Development Field Office,		Airborne Instruments Lab, Inc,	
Main Navy Bldg, Washington, D. C. . .	3	165 Old Country Rd,	
COMOPDEVFOR . . . . .	1	Mineola, N. Y. . . . .	1
U. S. Navy P. G. School . . . . .	1	Fairchild Engine and Aircraft Corp.	
NEL, San Diego, Calif. . . . .	2	Pilotless Aircraft Div,	
Office of Naval Research, Code 427. .	2	Farmingdale, N. Y. . . . .	1
Office of Chief Signal Officer, Pentagon		Grumman Aircraft Engineering	
Bldg, Washington, D. C. . . . .	1	Corp, Bethpage, N. Y. . . . .	1
Cambridge Research Center,		BAR, Buffalo, N. Y., for transmittal to	
Cambridge, Mass. . . . .	1	Cornell Aeronautical Lab, P.O.	
ANDB, Dept of Commerce, Washington,		Box 235, Buffalo, N. Y. . . . .	1
D. C., Navy Member . . . . .	1	BAR, College Point, N. Y., for	
USAF, Sandia Base, Albuquerque, N. M.		transmittal to	
Commanding Officer, U. S. NAV . .	1	Edo Corp, College Point, L. I.,	
Research and Development Div. . .	1	N. Y. . . . .	1
NAESU Naval Receiving Station,		USAF Plant Rep, Buffalo, N. Y., for	
Washington, D. C. . . . .	1	transmittal to	
		Bell Aircraft Co, Buffalo, N. Y. . .	1

# Aeronautical Electronic and Electrical Laboratory

Activity	No. of Copies	Activity	No. of Copies
BAR, Dallas, Texas, for transmittal to Chance Vought Aircraft Div, United Aircraft Corp, Naval Industrial Reserve Plant, Dallas, Texas. . . . .	1	INSMAT, Baltimore, Md., for trans- mittal to Bendix Aviation Corp, Bendix Div, Baltimore Md. . . . .	1
BAR, Baltimore, Md., for transmittal to Glenn L. Martin Co, Baltimore 3, Md. . . . .	1	Vestinghouse Electric Corp, 2515 Wilkins Ave, Baltimore 3 Md. . . . .	1
BAR, El Segundo, California, for transmittal to Douglas Aircraft Co, El Segundo Div, El Segundo, Calif. . . . .	1	INSMAT, Seattle, Wash., for trans- mittal to Boeing Aircraft Co, Seattle, Wash. . . . .	1
Mr. Vernon Tucker, Douglas Aircraft Co, El Segundo Div, El Segundo, Calif. . . . .	1	INSMAT, Boston, Mass., for trans- mittal to McMillen Associates, Ipswich, Mass. . . . .	1
Corona Laboratories, National Bureau of Standards, Corona, Calif. . . . .	1	Rothson Manufacturing Co, Waltham 54, Mass. . . . .	1
BAR, Inglewood, California, for transmittal to Hughes Aircraft Co, Culver City, Calif. . . . .	1	U. S. Plywood Corp, Palmer, Mass. . . . .	1
Northrup Aircraft Corp, Northrup Field, Hawthorne, Calif. . . . .	1	Dr. Bruce Billings, Baird Associates, Inc, 33 University Ave, Cambridge, Mass. . . . .	1
BAR, St. Louis, Missouri, for transmittal to Electronics Research, Inc, Kentucky and Diamond Ave, Science Park, Evansville, Ind. . . . .	1	Dr. Edwin Blout, Polaroid Corp, Cambridge 39, Mass. . . . .	1
Emerson Electric Manufacturing Co, 8100 Florissant Ave, St. Louis, Mo. . . . .	1	Dr. R. C. Lord, Dept of Chemistry, MIT, Cambridge, Mass. . . . .	1
McDonnell Aircraft Corp, P. O. Box 518, St. Louis, Mo. . . . .	1	INSMAT, Detroit, Mich., for trans- mittal to Bendix Aviation Corp, Detroit, Mich. . . . .	1
BAR, Akron, Ohio, for transmittal to Goodyear Aircraft Corp, Akron, O. . . . .	1	INSMAT, Fort Wayne, Ind., for trans- mittal to Crescent-Farnsworth Corp, Fort Wayne 1, Ind. . . . .	1
BAR, Burbank, Calif. for transmittal to Lockheed Aircraft Corp, Burbank, Calif. . . . .	1	INSMAT, Los Angeles, Calif., for transmittal to Bendix Aviation Corp, Pacific Div, 18500 Sherman Way, North Hollywood, Calif. . . . .	1
BAR, Los Angeles, Calif., for trans- mittal to North American Aviation, Inc, Municipal Airport, Los Angeles 45, Calif. . . . .	1	California Reinforced Plastics Co, 1444 Fourth St, Berkeley 10, Calif. . . . .	1
BAR, Downey, Calif., for transmittal to Dr. R. M. Ashby, Aerophysics Lab, North American Aviation, Inc, Downey, Calif. . . . .	1	Consolidated Vultee Aircraft Corp, San Diego, Calif. . . . .	1
		Radio Corp of America, 11251 Van Orman Blvd, West Los Angeles 21, Calif. . . . .	1
		Technical Associates, 3736 San Fernando Rd, Glendale, Calif. . . . .	1
		Zenith Plastics Corp, 1548 W. 155th St, Carlsbad, L. A. County, Calif. . . . .	1
		INSMAT, Chicago, Ill., for transmittal to Collins Radio Corp, Cedar Rapids, Ia. . . . .	1

## Aeronautical Electronics and Elec.

Activity	No. of Copies
INSMAT, San Francisco, Calif. for transmittal to Delmo Victor Co. San Carlos, Calif.	1
INSMAT, Philadelphia, Pa. for transmittal to The Franklin Institute, Philadelphia, Pa.	1
INSMAT, Houston, Texas, for transmittal to Texas Instruments, Inc., 2201 Lemmon Ave., Dallas, Texas	1
INSMAT, New York 13, N. Y. for transmittal to Farrand Appliance Co., Inc., Bronx Blvd. and E. 18th St., New York, N. Y.	1
Hazeltine Electronics Corp., 1770 Broadway, New York 15, N. Y.	1
Hillyer Engineering Co., 130 E. 14th St., New York, N. Y.	1
Lunn Laboratories, Inc., 226 Glen Cove Ave., Glen Cove, L. I., N. Y.	1
Servo Control America, New Hudson Park, L. I., N. Y.	1
Specialties, Inc., 1000s Military Rd., Syosset, L. I., N. Y.	1
Sperry Gyroscope Co., Great Neck, L. I., N. Y.	1
Mr. H. A. Wheeler, Wheeler Laboratories, Inc., 122 Cutter Mill Rd., Great Neck, L. I., N. Y.	1
INSMACH, Schenectady, N. Y., for transmittal to General Electric, 1000 E. Third St., Schenectady, N. Y.	1
Mr. A. Canada, General Engineering and Consulting Lab., Camille Ave. Plant, General Electric Co., Schenectady, N. Y.	1
INSMAT, Newark, N. J., for transmittal to Lavoie Laboratories, Matawan-Freehold Rd., Morganville, N. J.	1
Federal Telecommunications Laboratories, Inc., 500 Washington Ave., Nutley 10, N. J.	1
INSMAT, Camden, N. J. for transmittal to Radio Corporation of America, RCA Victor Division, Camden, N. J.	1
Mr. I. N. Brown, RCA Victor Division, Camden, N. J.	1
Dr. G. A. Morton, RCA Laboratories, Princeton, N. J.	1

**BEST AVAILABLE COPY**